NUTRITIONAL Status of Kashmiri WOMEN

By
Dr. Nighat Nasreen

Nutritional Status
of
Kashmiri Women

- The piece of work will provide information about.
- Nutritional status of Kashmiri women during their reproductive period.
- Prevailing nutritional deficiencies amongst them.
- Degree of malnutrition.
- Nutrient intake of women during different physiological status.
- Dietary habits and nutritional awareness amongst Kashmiri women.

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Dedicated

to

My Parents

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Nighat Nasreen

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(Introduction)

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>
> UNICEF

INTRODUCTION

Nutrition in regarded as vital component of health.[1] The word nutrition comes from a Latin root nutr, which means to nurture or nourish.[2] Nutrition has been simply defined as "the food you eat and how your body uses it." The physiological need for food is actually the need for nutrients, the chemical substances obtained from the food that allow the proper functioning of the body. Nutrition itself is seen as an outcome, a result of access to food, dietary intake, care of the individual and health are among the universally adopted human rights. Adequate nutrition is also a pre-requisite for most other human aspirations. From conception through old age, adequate nutrition is essential for individual development, activity, good health and self fulfillment. For societies and nations adequate nutrition is required for their function and success. The concerns range from day to day meeting of needs including survival especially in infants and children through lagged effects on performance of individual and societies,

even to inter generational influences notably through women's nutrition. Inadequate nutrition encompasses a set of issues with biological and social dimensions.(3)

The field of nutrition in India had been sadly neglected but in recent years there has been a remarkable upsurge of interest in Health and Nutrition problems of women in the country due to the vigorous women 'movements'.(4) Women generally occupy a very underprivileged position in Indian society, although there are significant regional variations. Discriminations against females begin early in life with more females dying in infancy and childhood. Infact female mortality is greater than male mortality up until the age of 35, while in most of the rest of the world female mortality is correspondingly lower.(3) Nutritional status refers to health of an individual as it is affected by intake and utilization of nutrients sometimes the term nutrition is used to refer to the nutritional status of an individual. "The condition of the body resulting from the utilization of the essential nutrients available to the body" is termed nutritional status. It may be good, fair or poor depending on the intake of dietary essentials, on the relative need for them and on body's ability to utilize them.(5) The health status of a person mainly depends on his nutritional status. So there is a need to achieve nutrition and health balance. Nutrition is an important factor that influences the health status of people. Many health problems can be solved just by providing better nutrition.(6)

Nutritional status refers to both the types and amounts of nutrients available in the body and the body's utilization of nutrients. Good nutritional status is necessary but not sufficient for optimal health. Nutrient intake is affected by psychological, socio-cultural and physiological influences. The form of food eaten may influence the bio-availability of certain nutrients that is whether they can be used by the body. Once inside the body, nutrients work together in physiologic processes. Physiologic processes can be influenced by the thoughts and emotions. Interactions of nutrients with each other

and with individual are exceedingly important.[7] Food is a common denominator to all people throughout the world. Not only is it essential for their physiological needs but it also fulfills social, economic, geographic, ethnic and religious needs.[8]

Women of reproductive age constitute 22% of total population and are considered vulnerable or special risk group.[9] The nutrition and health status of women is important for the quality of their lives and for the survival and healthy development of their children$_{13}$. Nutritional status of women is important for health and work capacity of women themselves as well as for the health of their offspring. Unfortunately, problems of under as well as over nutrition prevail in female population world wide. The proportion of women suffering from chronic energy deficiency (BMI < 18.5 Kg/m^2) is about 70% in India, Bangladesh and Pakistan (ACC/SCN 1998). For Africa this proportion is 20 – 40%. There is evidence that women are more likely than men to suffer under-nutrition in some of these regions (e.g. South Asia) in part because of burdens of reproduction and social conditions in general (Laslie, 1991). In some regions (Africa) rates of under-nutrition have increased during recent decades as result of economic turmoil. Concern has been raised that babies born to malnourished women have a high risk of developing chronic diseases during adulthood than babies born to better nourished women (Stein et al, 1996). At present however, evidence is lacking to support a link between poor maternal nutritional status and the determinants or consequences of chronic disease in the offspring of such women as children or as adults (Rasmussen, 2001). A woman's nutritional status at conception may modify not only the course of pregnancy and its outcome but also the way her nutritional status changes during her pregnancy.[11]

Much of the information available on nutrition of women relates to their nutritional status during pregnancy and lactation and its effects on delivery and child bearing functions. Malnourished women are particularly vulnerable to pregnancy and lactation and its

effects on delivery and child bearing functions. Malnourished women are particularly vulnerable to pregnancy and child birth complications which can end in loss of their lives. Low weight and / or immature and malnourished children born to such women are themselves vulnerable to life threatening disease and nutritional problems. Deficiency of energy, protein and macronutrients like vitamin A, iron and iodine have well recognized health consequences. It is thus obvious that by concentrating on proper nutrition throughout the life cycle of a woman, she would have much healthier life to pursue her multiple responsibilities for production, reproduction and care of family more efficiently, thereby in turn enhancing her social and economic status.[(12)]

There is a strong association between nutritional status and attainment of menarche as the girl has to reach a certain height and body weight before menarche occurs. The average age of menarche in India is 13.5 years. However the girl from upper socio- economic status appear to be attaining menarche around 12.6 years in contrast to 13.9 years in girls from low socio-economic status.[(13)] Poor pre-pregnancy weights of mothers and poor nutrition status are a reflection of the poor status of girls during childhood and adolescence.[(14)] The hallmark of poor maternal nutrition in a community is the high proportion of babies born in it with low birth weights – less than 2.5 kg (small for gestational age). Available evidence suggests that nearly one-third of babies born in our country are of low birth weights which is not only an evidence of poor maternal nutritional status but is also indicator of possible poor future development of the baby.[(4)] Adequate nutrition before and during pregnancy has greater potential for a long term health impact than it does at any time. Needs of the pregnant women are not sum of the needs of the growing foetus added to those of a mature women. Maternal health is a complex, influenced by various genetic, social and economic factors, infections and environmental conditions, many of which may affect the foetal growth.

A woman who has been well nourished before conception

begins her pregnancy with reserves of several nutrients so that the needs of the growing foetus can be met without affecting her health. The effect of under-nutrition during reproduction will vary depending upon the nutrients involved, the length of time it is lacking and the stage of gestation at which it occurs. A woman whose diet is adequate before pregnancy is usually able to bear a full term viable infant, without extensive modifications of her diet. Mother's diet should produce adequate nutrients so that the maternal stores do not get depleted and produce sufficient milk to nourish her child after birth. The nutritional demands are highly increased in an adolescent mother. Due to under nourishment of the mother the baby is at an increased risk of being premature with low birth weight and developmental irregularities Intra-uterine nutrition is highly important for the growth of central nervous system and kidneys of the foetus which mature during the latter part of pregnancy. Therefore nutrition deficits before birth can never be wholly reversed after birth; although role of nutrition in determining pregnancy outcome is not yet precisely known but increasing evidence indicates that malnutrition of mother is associated with low birth weights, still births, neonatal mortality and birth defects. Research is continuing to investigate the relationship between maternal malnutrition and physical performance of offspring. The effect of maternal malnutrition on foetal growth is not fully known. It is very difficult to define a direct cause and effect relationship between the nutritional status of the mother and the pregnancy outcome, in part because nutrition is associated with socio-economic variables and exerts its influence in concert with many other factors. A variety of ill effects caused by prolonged and severe maternal malnutrition during pregnancy include reduced size and number of brain cells, organs and placenta as well as changes in normal physiological functioning and cell constituents.

Lactation also exerts significant physiological and nutritional demands on the mother. A mother whose nutrition is inadequate may often deplete her reserves to provide needed extra energy for lactation.

The calorie and protein content of milk from under nourished mothers may not significantly vary from that of well-nourished mothers, but the quantity is often reduced.[15]

Nutritional Assessment is the process whereby the state of nutritional health of an individual or group of individuals, is determined. It includes anthropometric, clinical biochemical and dietary data. The conclusion reached through nutritional assessment becomes the basis for the development of intervention programmes in the community and for the planning and implementation of nutritional care for individuals. Nutritional assessment is important to determine those individuals who are vulnerable to nutritional problems. It is also helpful in providing information about the general nutritional status of the community.

Malnutrition plays a key role in maternal mortality. "Need to young children, pregnant and lactating women are nutritionally the most vulnerable group, especially in the developing regions of the world and yet comparatively little is known of their special nutritional needs" (WHO-1965). Majority of women are in constant state of nutritional stress beginning in the childhood, then adolescence, and continuing through the child bearing period which often commences before growth has ceased, and consists of a continuous cycle of pregnancy and lactation, all too resulting in premature death. Chronic protein energy malnutrition and Iron deficiency anaemia are among the common nutritional deficiencies prevalent in women.[12]

Women should not be considered solely with respect to their reproductive roles as mothers, adequate nutrition is a human right for all and the nutritional benefits to women's social and economic capabilities need to be viewed as goals.[10]

Dietary habits are among the oldest and most enriched aspect of any culture. Their formation begins in early childhood and is effected by variety of factors and all impinge on the individual. By the time adulthood is reached food habits are apt to be fairly rigid and immutable.[9] Food habits are sum of the food choices of an

individual, constituting his total diet. The manual for the study of food habits defines food habits as, "the way in which individual or groups of individuals in response to social and cultural preserves, select consume and utilize portions of available food supply.[17]

Eating behavior develop from cultural, societal and psychological patterns. These patterns reflecting food habits that have been transmitted from preceding generations are the heritage of any given ethnic group. They may be influenced by interactions with other groups, so that some intermingling of patterns is inevitable. Nutritional practices and patterns are developed by people's tendency to settle into fixed habits. Eventually, they characterize regional and national eating practices either poor or good. Poor food habits are seen in a person who eats only what he likes while total disregard to the quality of food and to the possibility that they may not add up to an adequate diet. These habits may also be due to poverty and other deprivations. Good food habits on the other hand are judged by the willingness and interest a person shows in eating the kind and amounts of foods which are needed for nutritional adequacy. Thus the food habits of a community furnish presumptive evidence of nutritional status of it population.[18]

Careful systematic analysis of women's diet and nutritional status are rare. Data from small and infrequent studies of women's anthropometry, Iron status and dietary intake suggest that they are at high nutritional risk.[12]

In the state of Jammu and Kashmir much work has not been done to study nutritional status and dietary habits of Kashmiri Women. A need was hence felt to go into the study. Therefore the researcher has undertaken the present study entitled "Nutritional Status and Dietary Habits of Kashmiri Women". The present study in the long run will help to improve nutritional knowledge, dietary habits which in turn will have impact on nutritional status of women. As already mentioned women form very important group of out society, therefore in order to prepare them for being healthy mother's nutritional status

and dietary habits play an important role. Thus the present study aims at following objectives:

1. To assess nutritional status of women through:

i) Anthropometry

ii) General Physical Examination

iii) Dietary Assessment

2. To know dietary habits of women and their likeliness towards these foods.

3. To assess if women are aware about various nutrients, their sources and functions.

4. To know if women have knowledge regarding nutrient requirement and meeting additional nutrient requirements during different physiological states.

5. To assess the knowledge of women regarding the cooking practices.

The present chapter dealt with the introduction of the study under taken wherein aims and objectives were also laid down. Since secondary data forms an important documentation of any research work accordingly the second chapter is devoted to "Review of Literature done for the study".

Chapter II

(Review of Literature)

Section - A

(History of Nutrition)

"What little we know, what little power we possess, we owe to the accumulated endeavors of our ancestors. Mere gratefulness would already oblige us to study the history of the endeavors, our most precious heirlooms. But we are not to remain idle spectators. It is not enough to appreciate and admire what our ancestors did, we must take up their best traditions, and that implies expert knowledge and craftsmanship, science and practice".

-George Sarton, The History of Science and the New Humanism, 1956.

1. Science of Nutrition

What we need to keep body and soul bound together firmly enough to keep in good health, why we like the flavours and colours and why we select caviare instead of cowpeas comprise the study of nutrition.

The science of nutrition may be defined as the study of food in relation to man and the study of man in relation to his food. Both halves of this definition have equal weight. This sounds like a very broad field of study and indeed it is. Its breadth is illustrated by the diagram (Fig 1), which shows how nutrition stretches from soil to cell, including a great part of man's activities on the way.[19]

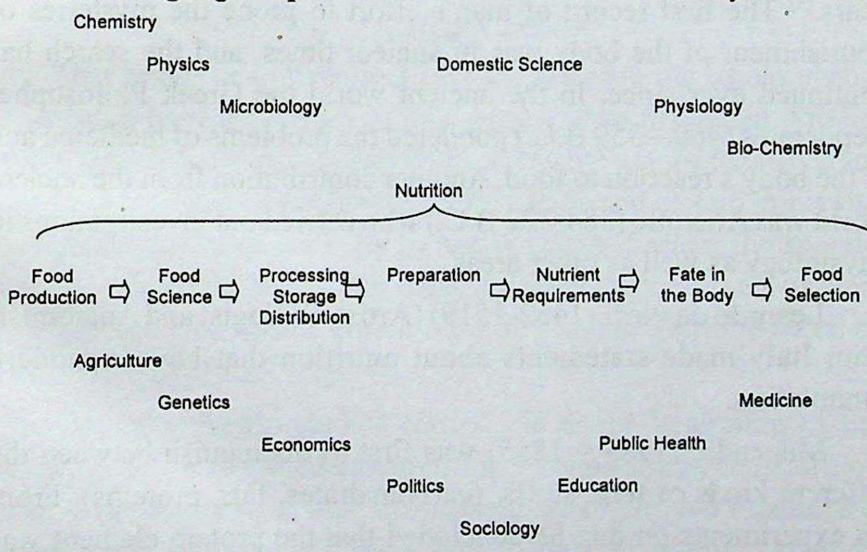

Fig. 1: The Science of nutrition covers a wide range of disciplines.

1.1 A Historical Perspective

Nutrition is a subject that touches everyone. It is the study of how the substance in food affects our bodies and our health.[20]

The science of nutrition has passed through tow main stages. The first stage led to the discovery of the nutrients and man's need

for them. The second stage in the development of nutrition is more complex. We now need to consider not only the amount of fat that we eat, but also the different types, of fat; not only the carbohydrate, but also what form it is in. We can no longer think of proteins, minerals and vitamins individually, but must pay attention to their interrelationships. The nutrients appear to be as closely related as the springs on a mattress – tread on one and the others move.[19]

The knowledge that nutrition is essential to well being presents a dramatic story that took centuries to evolve. Although often referred to as a 20th century science, nutrition has been an integral part of science and the practice of medicine for more than two thousand years.[8] The first record of man's effort to probe the mysteries of nourishment of the body was in ancient times, and the search has continued ever since. In the ancient world the Greek Philosopher Hepocrates (460 – 359 B.C.) pondered the problems of medicine and of the body's reaction to food. Another contribution from the ancient world was Aristotle (384-322 B.C.) who carried out investigations in physiology as well as other areas.

Leanrdo da vinci (1452-1519) (Artist, Biologist and Anatomist) from Italy made statements about nutrition that have a modern connotation.

Magendie (1783 – 1855) was first to distinguish between the different kinds of food stuffs, (carbohydrates, fats, proteins). From his experiments on dog he concluded that the protein element was necessary. However even this information was not applied to the study of respiratory exchange for many years. Regnault and Reeset in 1840 showed that the ratio of carbon dioxide expired with the kind of food.[21] Germany Baron Justus von Liebig (1803 – 1873) taught that fats and carbohydrates were fuel foods and termed the nutrients that formed body tissues during growth" plastic food", and Karl von Voit (1831 – 1908) believed that the requirement of protein is dependent on the organized mass of tissues; the requirement of fat and carbohydrate is dependent on the amount of mechanical work

accomplished.[22]

In 1883 - 84 Rubner found that carbohydrate and fat were interchangeable in nutrition on the basis of their energy equivalents. One hundred calories in fat were the nutritive equivalent of the same number in carbohydrate. This is the iso-dynamic law of Rubner and is valid except when food is given in large quantity and the specific dynamic action appears. His investigations showed.[21]

100 gm fat	=	211 gm protein
		232 gm starch
		234 gm cane sugar
		256 gm glucose

That brings us to twentieth century. Never in the whole history of nutrition have the strides of this century been paralleled. Studies of this century have encompassed the discovery and the identification of certain nutrients (the vitamins, amino acids and certain minerals), the nutrient needs of the body in health and in disease, the specific and interrelated functions that these nutrients play, sources of these nutrients and their use to enrich food to a higher nutritive value all for the benefit of man kind.[22]

The calorimetric studies carried out at the beginning of this century clearly established a relationship between energy and nutrition. Later experiments were able to correlate the nutritional functions of proteins and it was found that food proteins or their amino acids are the antecedents and precursors of many of the body's catalysts which are necessary for the chemical reactions involved in digestion and nutrition. During last 30 – 40 years there has come an awakening to the importance of mineral elements in nutrition and the nutritive value of foods. It has now been established that these elements are essential.

The vitamins as a class are the other compounds whose importance in nutrition is now well established. Between 1930 and 1940 the majority of vitamins were identified, isolated from foods

and synthesized in the laboratory.

The twentieth century ushered in the "One World" concept also with it, concern not only for an adequate diet for our nation but for enough food to feed the world.[23]

The credit of initiating the study of nutrition also goes to Professor L. D. Stamp (1960) who computed standard nutrition unit (SNU).[24]

Nutrition research has demonstrated the relationships of nutritional status to health, vigor and achievement. Three international organizations, actively interested in nutritional aspects of health, stand ready to help. The nutrition committee of Food and Agriculture organization of the United Nations (FAO) is especially concerned with nutritional problems related to production, distribution and consumption of food. The nutrition section of (WHO) World Health Organization, also of the United Nations has as a primary obligation investigation of conditions related to clinical aspects of nutrition. UNICEF (United Nations Children Fund) was established to better health standards of children in needy areas. The agency for international development of United States (AID) also contribute much towards better nutrition for people in developing countries.[25]

The problem of the assessment of nutritional status first attracted international attention in 1932 when the health organization of the league of nations called for a meeting in Berlin to discuss clinical and physical aspects of evaluation. In 1949 the joint FAO / WHO expert committee of nutrition emphasized the need or dietary assessment as a basis for the planning of national nutrition policy. To aid in such assessment, in 1963 the joint committee published a manual on the medical assessment of the nutritional status, which was revised in 1966.

A number of surveys, at international, national and local levels have been conducted to determine nutritional problem. The FAO has conducted international food and nutrition survey since the Second

World War. The U.S. Department of Agriculture has also conducted international nutrition surveys.

The ICNND and its successor organizations, the nutrition program of the U.S. Public Health Service have conducted surveys at the request and with the co-operation of the foreign government's concerned in more than thirty countries.[15]

Indian philosophers stressed the importance of food for uplifting the soul and health of the body.[26]

The Indian society, has, a rich historical past. Its culture and civilization ranks with those of the most civilized countries of the world. Nearly all the civilizations of the old world became extinct for they were not able to withstand on slaughts of the foreigners. India had a number of immigrants and invaders from across the border, but Indian Society assimilated the new culture into its fold by slow process of change and adjustment and continued to maintain its individualistic character inspite of various vicissitudes.

In fact the present society has its roots in the ancient past and even today it is difficult for the majority of the people in this country to accept the twentieth century civilization. The past and present seem to be living side by side in India. The ancient past is the basis and necessary changes are slowly being effected to suit modernization

It is difficult for people to change and this is much more true in the matter of food habits than in an other aspect of the society. We still eat some foods in exactly the same way as our ancestor did thousands of years ago.

In the pre-historic period man lived on what ever he could gather around him in the form of fruits, leaves or flesh etc. Slowly his knowledge about food increased and he began to add more and more items in his diet.

The Aryans, who came to India, brought with them knowledge of new food articles, methods of cooking and of raising food crops.

In the early stages of India civilization, we ate vegetables, meat,

egg and fish without restriction or taboos, slowly; there was a reaction against the eating of meat because of the indiscriminable killing of animals. As with many other civilizations, food restrictions which started out for one reason or the other continued for centuries when the original premise had completely disappeared. Some restrictions were firmly imposed to protect India from getting into contact with the invaders and adopting their customs, though these rules were said to be intended to maintain the purity of food. For others like the Jews, do not eat non-kosher meat for religious reasons; it is the same with Islamic religion, they do not take pork, ham or bacon. The Hindus do not eat beef, as according to them cow is the most important animal.

The religious movements like Buddhism and Jainism had their impact on food habits as well. The use of meat was further restricted by the founder of these two religions.

After the Aryans settled in India, the country was not disturbed for a quite a long time. This gave an opportunity to them to pay more attention to the food values and the nutritive aspect of food. Different food for students, sages and saints, for warriors, and worshippers, men and women, for nursing and expectant mothers was distinctly suggested so as to enable them to eat and to perform their assigned roles effectively and efficiently. India was, for years, free from outside influences the really noticeable change came with our independence in 1947. Taboos against certain foods began to disappear. This was especially true in towns and cities, where people of different castes and different areas of country came into contact and began to learn to live with each other.

Food is the core of civilization. Different forms of civilizations grew up around food available in different areas. The search for food has led people to migrate to different parts of the world. Great wars have been fought among nations, to have a better living, power and riches, the most important of all riches being food. When one is hungry, one can not think or do anything. A man free from hunger,

but not overfed, is in his best form. It is then that culture and civilization thrive.

In the Upanishads, a Hindu religious text, food is called "panacea" because all animate life depends on it. According to them purity of food leads to purity of thoughts and action.

Kashmir lies in the north-west of India. It consists of two parts 'Jammu' and 'Kashmir Valley'.

Kashmir has had a lot of wars and invasions. In the many hundreds of years of the history of Kashmir, the people have come in contact with may other races and tribes, like the Greeks, Romans, Persians, Huns and many others and in each turn have left their influence. The indigenous people took the different civilizations and cultures and blended them with their own.

The people of Kashmir are mostly agriculturist. The only towns which can be called by that name are Jammu and Srinagar.

Rice is the staple food of Kashmir, though they grow wheat as well Barley is the other important food grain. This is only used by poor people or by hermits and by those who have renounced the world.

In Kashmir, food habits are governed by the climate. It is very cold in winter with a heavy snowfall and quite mild in summer. During winter, fresh vegetables are not available all over the state, except in Jammu and Srinagar. Some fruits are canned in Kashmir. So to get over this difficulty, vegetables such as turnips, radishes, egg plants and cabbages are dehydrated in summer and are used in winter when fresh vegetables are not available. Fish is also dried in the sun and widely used. The Muslim influence and the availability are two reasons why most of Kashmiris are non-vegetarians.

The food of the ordinary people is very simple. Rice is eaten boiled, with meat and vegetable curry. Some of the rice cooked the night before is kept for the next morning and people have it for breakfast before they go to work in the fields. Both the morning and evening meals are the same.

There is very little difference in the food of the northern and southern parts of Kashmir.

The richer population of Kashmir, having descended or come closely in contact with the Moughal and the Afghan Kings knew a lot about delicious cooking of rice and meat. Especially the Moughals were epicurean by temperament and understood good eating and good living. They introduced Persian cooking, which they had brought with them. Most of meat dishes were originally introduced by the Muslim conquerors; it is not improbable that one may come across the same type of preparations in the Middle East.

Fruit is a very important and a very common article in Kashmiri diet. The climate being so favorable for growing all kinds of fruits, like apples, cherries, peaches, grapes etc; which grow in a cold climate, are grown in abundance and are available to the people, whether they have their own gardens or not. No one is prevented form picking the fruits they like to eat. They eat savoury cakes, milk and yoghurt on festivals.(27)

Section - B

(Physiology of Nutrition)

"You are what you eat"

1. NUTRITION

The nutrition is the science that interprets the relationship of food to the functioning of living organism.[23] It includes the intake of food, liberation of energy, elimination of wastes, and all the synthesis that are essential for maintenance, growth and reproduction.[28]

Nutrition has been simply defined as "the food you eat and how your body uses it". The physiologic need for food is actually the need for nutrients.

2. FUNCTIONS OF FOOD

Food's most basic function is to provide nutrients to the body. Nutrients are the substances in food needed to support life functions.[29] Nutrients have three general functions, all related to biological needs:-

A. Building and maintaining the structure of the organism.

B. Serving as energy source.

C. Regulating biological processes.

A. The role of nutrients in building and maintenance of organisms:

Nutrients are the materials necessary for building and maintaining physical structure, including the solid materials and fluids surrounding the cells as well as the cells themselves.

Water, proteins and minerals are the most important building materials because together - these three nutrient classes make up a very large part of body's total lean mass.[30]

The proteins are amazing, versatile and vital cellular working molecules. Without them, life would not exist. The building blocks of proteins are amino acids. The body needs amino acids to grown new cells and to replace worn out ones. The body makes enzymes, hormones and chemical messengers of nervous system from its amino acids. Antibodies are formed from amino acids to defend against

foreign proteins and other foreign substances. Within the body proteins help to regulate the body's electrolyte and fluids. Proteins provide the netting on which blood clots are built. Proteins form integral parts of most body structures, such as skin, tendons, ligaments, membranes, muscles, organs and bones.[31]

Although carbohydrates and vitamins together constitute less than one one-hundredth of the weight of the body, these nutrients are nevertheless extremely important parts of body structure. Certain carbohydrates are integral parts of hormones and other important molecules, and the significance of vitamins in body structure is illustrated dramatically by decreased growth which occurs in many vitamin deficiencies.

Fat was once considered merely an inert store house of excess energy, to be drawn on in time of need. Today we know that fat tissue is a vital, active part of the body. In addition certain specialized fatty substances have important role as part of cells and organs; phospholipids for example are part of membranes of cells. It is therefore inaccurate to look upon fats as expandable body components as compared to the materials that constitute lean body tissues.

Finally, the old concept of body structure should be revised. Structure was once believed to be a relatively permanent arrangement, like that of a formal living room, whereas materials such as carbohydrates and fats were considered analogous to the fuels expended to heat the room. The materials formerly thought of as mere fuels are now known to be used to some extent as building materials. The modern concept of this continuous, dynamic, process of change, called turnover of body constituents makes the former classification obsolete. All six nutrient classes, and not just water, proteins and minerals, play major roles in the growth and maintenance of living systems.

In considering nutrition water is often overlooked, but it is second only to oxygen in importance to body functioning. Water is an essential component of body structure. It also acts as a solvent for mineral and

other physiologically important compounds.

The body needs organic compounds, such as carbohydrates, fats and proteins for proper nutrition but it also needs inorganic materials such as minerals. After the organic compounds have been oxidized, minerals remain to form actual body parts. For example Calcium, Magnesium and Phosphorous are components of bones and teeth.[30]

B. The functions of nutrients as energy sources:

Those nutrients which human cells break down in order to obtain energy are carbohydrates, fats and proteins are called energy nutrients. The energy nutrients used by humans have the following characteristics:-

I. They are all organic compounds which cells can break down to simpler compounds.

II. As a result of their break down, energy is released; the number of units of energy resulting from the breakdown of a given amount varies from nutrient to nutrient, however,

III. Energy nutrients do not include vitamins, minerals or water. The relationship of minerals, vitamins and water to energy are all indirect. In energy releasing reactions the substrates are energy nutrients. Vitamins and minerals are frequently necessary parts of the structures of enzymes which catalyze bio-chemical reactions and water molecules may enter into reactions as well as being liquid in which bio-chemical reactions occur.

C. The functions of nutrients in regulating biological processes:

Because life can continue only within a certain narrow range of conditions, everything that goes on in a living system must be regulated, or controlled. If an organism becomes too hot, too cold,

too acid, too non-acid, too abundant with respect to toxic materials or too lacking in needed substances, the organism will die. The mechanisms for controlling the internal environment include certain nutrients in the same way, in the same form in which they occur in the diet, well as many substances that are not properly called nutrients. Genes and hormones, for example need not be ingested because the body is capable of producing them. However, the materials from which they are produced must all be provided from the animals diet.[30]

3. NUTRITIONAL HEALTH OF ADULT FEMALE

Life cannot be sustained without adequate nourishment. Man needs adequate food for sustainable growth, development and also to lead an active and happy life. Health and good nutrition are therefore, considered to be interdependent systems.[32] The need for many nutrients changes at different stages of our lives, social , economic and psychological circumstances all influence nutritional status. Human beings are most vulnerable to impact of poor nutrition during rapid growth. If the essential nutrients are not present to support growth permanent damage to tissues and organs can occur.[33]

Good nutrition is never an easy goal to achieve. Yet good nutrition is a positive force that affect health and quality of life throughout the life cycle. The concept of ideal nutritional health suggests that all the essential nutrients are supplied to and used efficiently by the individual on a long term basis.[34]

The time to focus on good nutritional and other health habits, then is before a woman becomes pregnant. Maternal nutrition should be a focus during all phases of reproductive life and from childhood to menopause to ensure (including good nutritional status) at the time of conception. Good habits can then be carried into pregnancy, thereby providing optimum health and nutrition from before conception until birth.[35] The Woman entering her child bearing years reflects a host of influences to which she has been exposed throughout her own fetal period, infancy, childhood, and adolescence. The habits. attitudes

and values she developed during her earlier years will affect her nutritional status as she comes to maturity. The consequences of inadequate maternal nutrition represents a major health problem for society. Unfavourable consequences range from failure to conceive to failure of newborn infant to achieve child birth. The nutritional vulnerability of women of child bearing age is such that they are regarded as one of the high risk groups.[36]

Appropriate weight for height prior to pregnancy benefits pregnancy outcome. Weights outside the normal range (10 percent below or 20 percent above, standard weight for height and age) present some medical risk. Under-weight women are therefore advised to gain weight before becoming pregnant, and overweight women to lose excess weight.

Infant's birth weight strongly correlates with pre-pregnancy weight and is the most potent single predictor of the infant's future health and survival. A low birth weight baby is statistically more likely than a normal weight baby to contract diseases and low birth weight babies are nearly forty times more likely to die in the first month of life than normal weight babies are.

A major reason why the mother's pre-pregnancy nutrition is so crucial to a healthy pregnancy is that it determines whether she will be able to grow healthy support tissues: the placenta, the amniotic sac and the umbilical cord, as well as uterus. Malnutrition prior to and around conception keeps these tissues from developing fully.[37]

Prior to pregnancy all women should strive for appropriate body weights. This is especially important for underweight women. Second to underweight women, obese women are urged to attain healthy weights before pregnancy.

A major reason why the mother's nutrition before pregnancy is so crucial is that it determines whether her uterus will be able to support the growth of a healthy placenta during the first month of pregnancy. If the placenta works perfectly, the foetus wants for

nothing, if it doesn't, no alternative source of sustenance is available and the foetus will fail to thrive.[31]

3.1. Nutritional requirements of the Adult Female

3.1.1. Energy requirements: Energy is required for the many metabolic processes essential for life, physical activity. Energy needs of the adult vary with the body size, with the amount and severity of physical activity, with physiological state, and to a lesser degree,, with climate. Energy allowances for adult females are as follows:-

ENERGY REQUIREMENT OF REFERENCE INDIAN WOMEN

(Kcal's / Day) 1989

		Activity		
Sex	**Body Weight (Kg)**	**Sedentary**	**Moderate**	**Heavy**
Woman	*50*	*1875*	*2225*	*2925*

3.1.2. Proteins: Protein requirements by the body represents the sum of the needs for the essential amino acids and sufficient utilizable nitrogen for the synthesis of body protein and other nitrogen – containing compounds essential for health. Factors affecting the amount of protein required include protein quality, energy value of the diet, carbohydrate content of the diet, stage of growth and physiological state of the individual and variability among individuals.[17] The average daily requirement of an Indian adult, in terms of a high quality protein like milk / egg at the physiological level is estimated to be 0.5 g / Kg. The factorial value thus obtained has been increased by 50% to obtain the requirement at the physiological level. Assuming a coefficient of variation of 12.5% the safe level of intake ($M \pm 2SD$) for an adult will be 0.625 gms of protein per kg in terms of a high quality protein. When adjusted for the lower quality of dietary proteins with 65 NPU, the safe levels of intake in terms of dietary protein will be 1.0 g/Kg/day. The RDA for adult female is: [36]

PROTIEN REQUIREMENT OF ADULT FEMALE

Sex	Body Weight (Kg)	Requirement (gms)	
		Per Kg	Per Day
Woman	*50*	*1.0*	*50*

3.1.3. Vitamins: Vitamins are chemically unrelated organic compounds required in relatively minute amounts for normal growth and maintenance of life. The absence of certain vitamins from the diet will result in characteristic deficiency symptoms.[34]

i) *Vitamin A:* Vitamin A is essential for normal vision, for maintaining the integrity of epithelial tissues and for a wide variety of metabolic functions. Vitamin A in the human diet exists either as preformed vitamin A (Retinol) or as bð– Carotene, which in the body is converted into vitamin A. Only foods of animal origin contain preformed Vitamin A. Since bð- Carotene forms a major source of dietary vitamin A in many developing countries including India, the efficiency with which it is absorbed and utilized becomes important in translating bð-Carotene Values into retinol equivalents.

The daily requirement of vitamin A for Non-pregnant and non-lactating women is 600 mðg / day Retinol or 2400 mðg / day bð-Carotene.

ii) *Vitamin D:* Vitamin D is now considered more as a pro-hormone than a vitamin. It can be synthesized in the body in adequate amounts by simple exposure to sunlight even for 5 minutes per day. Indian diets do not supply even one tenth of the present recommendations for Vitamin D. In prescribing medicinal Vitamin D under certain situations where there is a minimal exposure to sunlight, a specific recommendation of daily supplement of 400 mðg is made.

iii) *Vitamin E:* Vitamin E is a group of chemically related compounds known as “tocopherols”. It exists in three forms; alpha,

bδ- and gamma- tocopherols, with the alpha form being the most active biologically. Vitamin E functions as an anti-oxidant and is essential for the prevention of degenerative changes in certain tissues. It prevents the formation of toxic peroxides of unsaturated fatty acids that may damage cells.

A daily intake of Vitamin E (tocopherol) is 0.8 mg/g of essential fatty acids.[36]

iv) *Vitamin K:* Vitamin K, the coagulation, vitamin occurs in nature in two forms, phylloquinone (Vitamin K_1) and menaquinone or Vitamin K_2. A third form is the synthetic compound menadione, Vitamin K_3.

Vitamin K functions primarily to promote the normal clotting of blood and to prevent hemorrhage. A vitamin K deficiency will cause an increase in blood clotting time. However this deficiency is rarely seen in the human.[34]

v) *Vitamin B Complex:*

v.i. *Thiamine*: Thiamine is found in enriched cereals, whole grain cereals, milk, legumes and meat. Allowances for thiamine are usually related to energy intake[10], and an intake of 1.1 mδg / day is recommended for adult female.[36] Symptoms of mild thiamine deficiency include increased hypersensitivity, loss of appetite, fatigue and general weakness. An extreme deficiency leads to the disease beri beri characterized by damage to nervous system.

v.ii. *Riboflavin*: Symptoms of a riboflavin deficiency include dermatitis, cheilosis (Drying and cracking of lips), angular stomatitis (inflammation of mucous membranes of mouth) and damage to conjunctiva of the eye.[34] Riboflavin requirements are related to caloric intake and the RDA is established at 1.3 mδg / day for the adult female.[36]

v.iii. *Niacin*: Pellagra, a disease characterized by rough or inflamed skin, nervousness, mental depression and intestinal disorders is caused by niacin deficiency. Niacin recommended intakes are also

related to calorie intake[34] and are 1.4 mðg / day for the adult woman.[36]

v.iv. *Vitamin B_6*: Vitamin B_6 is a collective term referring to three pyridine compounds; pyridoxine, pyridoxal, and pyridoxamine. A deficiency of Vitamin B_6 can cause skin lesions, including glossits (inflammation of tongue), dermatitis, stomatitis and cheilosis. The recommended daily intake for vitamin B_6 is 2.0 mðg / day for the adult female.

v.v. *Folacin*: Folacin, a general name for folic acid and related compounds plays a role in the formation of purines and pyrimidines from which nucleic acids are derived. It functions in the formation of red blood cells and also plays a role in certain amino acid interconversions and methylation reactions.

A folacin deficiency results in accumulation of immature red blood cells (megalo blasts) in the bone marrow, leading to macrocytic anaemia. Other deficiency symptoms include glossitis, gastro intestinal disturbances and neurological damage.[34]

The RDA for folacin for a woman is 400 mcg per day.[36]

v.vi. *Vitamin B_{12}*: Vitamin B_{12}, or Cobalamine, is required for normal red blood cell formation. Its deficiency results in pernicious anaemia characterized by megaloblastic red blood cells and eventually extensive neurological damage. Vitamin B_{12} corrects the blood abnormalities of pernicious anaemia and arrests the program of nervous tissue damage.[34] The RDA for adult women is 1 mðg / day.

vi. *Vitamin C*:- Vitamin C plays a role in the synthesis of collagen, wound healing amino acid and carbohydrate metabolism and synthesis of some hormones. It also has an influence on the absorption and metabolism of Iron.[36]

Early signs of vitamin C deficiency include weakness, irritability, bleeding gums, gingivitis, loosening of teeth, and a tendency to bruise easily.[34] The daily requirement of vitamin C for an adult female is 40 mgs / day.[36]

3.1.4. Minerals: Twenty six or more different minerals are found in varying amounts in the body, and about 15 of these are necessary for good nutrition. Certain minerals are required by the body in relatively large amounts and are referred to as macro-nutrients. These include Calcium, Phosphorous, Sodium, Chloride and Magnesium. Iron, Manganese, Copper, Iodine, Zinc, Cobalt, Fluorine, Selenium and Chromium are trace or micro-nutrients and are required in smaller amounts.

i) *Calcium:* Calcium is present in the body in greater amounts than any-other mineral, and approximately 99% of body calcium is concentrated in the skeletal system. Throughout life calcium builds and shapes the frame work of the body and gives strength to bones and teeth. The remaining 1% percent is distributed through the soft tissues.[(34)]

The ICMR has recommended a daily intake of 400 mg for Non-pregnant non-lactating women.[(36)]

An insufficient supply of calcium may result in stunted growth, poor quality of teeth and bone, or other bone disorders "osteoporosis" a disorder of bone metabolism that occurs in middle and old age, is often attributed to low calcium intake. Other nutrients however, such as vitamin D and fluoride, may also be involved.

ii) *Phosphorous:* Phosphorous is the second most abundant mineral in the body, with 70 – 80% being found in bone and teeth.[(17)] Since phosphorous deficiency is unlikely on the types of diets consumed in India, ensuring an adequate phosphorous intake may not present a problem. Calcium: Phosphorous ratio of 1:1 may be maintained in most age group, except in infancy.

iii) *Magnesium, Sodium and Potassium:* Magnesium is a component of cells and is essential for various metabolic reactions. Magnesium concentrates in the bone and it is important for maintaining electrical potential in nerves and muscle membrane. Magnesium deficiency leads to neuromuscular dysfunction.

Magnesium occurs widely in foods and plant foods are particularly rich in Magnesium. Dietary deficiency of magnesium is therefore unlikely to occur in the Indian population. No specific recommendations are made with regard to dietary intake of magnesium.

Since Sodium intake is high in India and a high intake is associated with hypertension there is a need for fixing limits of intake of Sodium. There is no information available on the body turnover of sodium and potassium in a tropical country like India where sodium and potassium can be lost significantly in sweat. In the absence of such data no specific recommendations of sodium and potassium are made.[36]

iv) *Trace Elements:* At present fifteen trace elements are believed to be essential for the mammalian species; of which eight elements are known to be required by man. These are Iron, Zinc, Copper, Chromium, Cobalt, Iodine, manganese, Molybdenum and selenium. However, only the deficiency of a few of these elements is observed in man. Iron and Iodine deficiencies are widespread while deficiencies of Cu, Zn, Cr, and Se have been reported in recent years. Suggested daily intake of trace elements by an Indian adult (male and female) is chromium 67 mðg, Copper 2.2 mg, manganese 5.5 mg, Zinc 15.5 mg and Iodine 150 mðg per day.[18]

v) *Iron:* The best known micronutrient is probably iron, and two-thirds of the iron in the body is present in blood mainly as a component of haemoglobin.[34]

Iron absorption from common Indian diets determined earlier using chemical balance method yielded figures ranging from 7 to 20%, with a median figures around 10% for an adult female, iron absorption is 8.0% from rice based diet, 5.0% from mixed cereal diet and 3.3% from wheat / millet diet.[16]

In women during reproductive age, besides the basal loss, iron is lost by menstrual loss of blood.

The median blood loss is 30 ml equivalent to an additional daily requirement of 0.5 mg of iron. Many normal women lose much more blood, the figure reaching 80 ml in about 10% of women corresponding to a loss of 1.0 mg iron / day or more. This daily menstrual loss of iron is compuled from the iron content of blood lost during the menstrual period averaged over a month. Menstrual loss of iron in Indian women has been taken to correspond to a daily loss of 8 mg / Kg body weight or 0.5 mg /day. An upper limit of menstrual loss of iron of 1.0 mg / day would mean a menstrual loss of 16 mðg / kg. Adopting this higher value, the total basal plus menstrual loss of iron in women would be 30 mðg / Kg / day.

Iron requirement of adult female (Non-pregnant non-lactating) is 30 mg / day.[36]

RECOMMENDED DIETARY ALLOWANCES FOR AN ADULT FEMALE

Nutrient	Activity		
	Sedentary	Moderate	Heavy
Energy Kcal	1875	2225	2925
Protein g	50	50	50
Calcium mg	400	400	400
Iron mg	30	30	30
Vitamin A (Retinol) mcg	600	600	600
β-Carotene mcg	2400	2400	2400
Thiamine mg	0.9	1.1	1.2
Riboflavin mg	1.1	1.3	1.5
Niacin mg	12	14	16
Pyridoxine mg	2	2	2
Vitamin C mg	40	40	40
Folic Acid mcg	100	100	100
Vitamin B_{12} mcg	1	1	1

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4. NUTRITIONAL HEALTH OF PREGNANT WOMEN

The effects of nutrition extends over years. A woman's nutrition prior to and throughout pregnancy and lactation affects not only her own health but also the growth, development and health of her child even long after it has been born. A healthy, well nourished women whose nutritional status was good prior to becoming pregnant has a very good chance of delivering a healthy full term baby for normal birth weight.[38] Maternal nutrition is critically important to both mother and child.[5]

The woman who has done a lot already to ensure an optimal pregnancy outcome. Then, during the pregnancy itself if she eats a variety of nutrient - dense foods, her own and her infants health will benefit further.

Full nutrient stores before pregnancy are essential both to conception and to healthy infant development during pregnancy. In the early weeks, before many women are even aware that they are pregnant, significant developmental changes occur that depend on a woman's nutrient stores.[37]

An underweight woman who fails to gain weight adequately during pregnancy is most likely to bear a baby with a dangerously low birth-weight. Infants birth-weight is the most potent single indicator of an infants future health status, some researchers suspect that poor nutrition during gestation may even set the stage for developing cardiovascular disease and a week immune system in the future person's later life.

A low birth weight baby, defined as one who weighs less than 5.5 pounds (2500 grams), is nearly forty times more likely to die in the first year of life than is a normal weight baby. Such a baby is also likely to be unable to do its job to obtaining nourishment by sucking or to win its attention by energetic, vigorous cries and other healthy behavior. The low-birth weight infant may become an apathetic,

neglected baby, and this compounds the original malnutrition problem and leads to illness. For these reasons, under-weight women are advised to try to gain weight before becoming pregnant or to strive to gain adequately during pregnancy.

The infant of an obese mother may be larger than normal and born late or it may be large in size even if born prematurely. In the latter case a large premature baby may not be recognized as such and may not receive the special care it requires from medical staff. Also, obese pregnant women more often suffer gestational diabetes, hypertension and infection after the birth than do women of healthy weight.

If the mother's nutrient stores are inadequate during the period when the body is preparing to develop placenta, then the placenta will never develop properly. As consequence, no matter how well she eats later, the woman's unborn baby will not receive optimal nourishment.

The infant is likely to be a low birth weight baby with all of the associated risks. After getting such a poor start on life, children may be ill equipped even as adults, to store sufficient nutrients and a girl may also be unable to grow an adequate placenta. In turn she may bear an infant who is unable to reach full potential.

4.1. The events of pregnancy:

On implantation of the newly fertilized ovum (or zygote) in the uterine wall, a placenta begins to grow inside the uterus. The placenta which is a sort of cushion of tissues in which the mother's and baby's blood vessels interwine and exchange materials. The two bloods never mix, but nutrients and oxygen cross from the mother's blood into the baby's blood, while wastes move out of the baby's blood, ultimately to be excreted by the mother. The amniotic sac forms to cradle the baby, cushioning its transport of molecules, the placenta is a highly metabolic organ with some 60 sets of enzymes of its own. It actively gathers up hormones, nutrients and protein molecules such as

antibodies and transfers them into fetal blood stream. It also produces hormones that maintain pregnancy and prepare the mothers breasts for lactation.

During the two weeks following fertilization, the zygote divides into many cells, and these cells sort themselves to three layers. No increase in size takes place at this time, but it is a critical period developmentally. Adverse influences such as smoking, drug abuse and malnutrition at this time lead to failure to implant or to abnormalities that can cause loss of zygote, possibly even before the women knows she is pregnant. Both mother and child will benefit most from an optimal supply of nutrients uncontaminated by other materials.

The next six weeks of the development of the embryo register astonishing physical changes. At eight weeks, the foetus has a complete central nervous system, a beating heart, a fully formed digestive system and the beginning of facial features.

Each organ and tissue type grows with its own characteristic pattern and timing. Each organ depends most on it supply of nutrients during its own intensive growth period. For example, the foetus's heart and brain are well developed at 14 weeks; the lungs, ten weeks later. Therefore early malnutrition impairs the heart and brain; late malnutrition impairs the lungs.

Events during a critical period can occur only at that time and at no other. Whatever nutrients and other environmental conditions are necessary during this period must be supplied on time if the organ is to reach it full potential. If the development of an organ is limited during a critical period, recovery is impossible. Thus early malnutrition often does irreversible damage, although this may not become fully apparent until maturity and may never be attributed to events of pregnancy.

Women likely to develop nutrient deficiencies include those who:-

Δ Are young (adolescents).

- Δ Have had many recent previous pregnancies.
- Δ Lack nutrition knowledge, have too little money to purchase adequate food, or have too little family support.
- Δ Ordinarily consumed an inadequate diet due to food faddism, preferences, weight loss "dietiting", limited food choices or other reasons.
- Δ Smoke cigarettes or abuse alcohol or drugs.
- Δ Are lactose intolerant or suffer chronic health conditions requiring special diets.
- Δ Are over-weight or under-weight at conception.
- Δ Are carrying twins or triplets.
- Δ Gain insufficient weight or excessive weight during pregnancy.
- Δ Have a low level of education.

The last seven months of pregnancy, the fetal period, bring about a tremendous increase in the size of foetus. Critical periods of cell division and development occur in organ after organ. The amniotic sac fills with fluid and the mother's body changes. The uterus and its supporting muscles increase in size, the breasts may become tender and full , the nipples may darken in preparation for lactation and the mothers blood volume increases by half to accommodate for the added load of materials it must carry. Gestation lasts approximately 40 weeks and ends with the birth of infant.[32]

4.2. Physiological Changes and Resulting problems in pregnancy:

During pregnancy the foetus need for oxygen, nutrients and excretion increases the burden on mother's lungs, heart and kidneys. Although the mother's digestion and metabolic processes work very efficiently, some discomfort accompanies the changes her body undergoes to accommodate the foetus.

4.2.1. Heart burn, Constipation and hemorrhoids: Progestin's produced by the placenta relax muscles in both the uterus and the intestinal tract. This often causes heartburn as stomach acid steps up though the lower esophageal sphincter into the esophagus. When that happens, the woman should avoid lying down after eating, reduce fat consumption so that foods pass quickly from the stomach into the small intestine, and avoid spicy foods if they are not tolerated. She should also consume liquids between meals to decrease volume and pressure in the stomach.

Constipation often results from the relaxation of intestinal muscles, especially late in pregnancy as the foetus competes for space with the Gastro-intestinal tract. Consuming more water, dietary fibre, and dried fruits and exercise can help a pregnant woman avoid constipation and an often accompanying problem, hemorrhoids. Straining can lead to hemorrhoids, which are more likely to occur during pregnancy anyway because of physiological changes occurring during pregnancy.

4.2.2. Edema: Estrogens and progestins combine to cause connective tissue to retain fluid during pregnancy. Blood volume also greatly expands during pregnancy and normally contributes some edema. Overall, edema generally spells trouble only if hypertension and the appearance of protein in the urine accompany fluid retention.

4.2.3. Morning Sickness: Nausea is common in the early stages of pregnancy; it is possibly a reaction of pregnancy-related hormones circulating in the blood stream. Although known as "Morning Sickness" nausea may occur at any time and persist all day. It is often the first signal to a woman that she is pregnant. Some women partially control mild nausea by eating soda crackers, or dry cereal before getting out of bed, avoiding large fluid intakes early in the morning, cooking with open windows to dissipate nauseating smells, eating smaller, more frequent on meals, and avoiding foods that increase nausea. Usually, nausea, stops after the first trimester, but it can continue throughout the entire pregnancy.

4.2.4. Gestational Diabetes:- Hormones synthesized by the placenta antagonize the action of hormone insulin. This antagonism

can precipitate gestational diabetes, often beginning in weeks 20 to 24, particularly in women with family histories of diabetes.

4.2.5. Anaemia: To supply fetal needs, the mother's blood volume expands up to approximately 150% of normal. But the red cell mass expands only 20 % to 30% above normal and this occurs more slowly. This leaves proportionately fewer red cells in a pregnant woman's blood stream. The lower reaction of red blood cells is a condition known as physiological anaemia, since it is a normal response to pregnancy, rather than the result of poor nutrient intake. If during pregnancy, however, iron stores and / or dietary intake – particularly of iron and folate is inadequate, resulting anaemia may require medical attention.

4.2.6. Pregnancy-induced hypertension: A high risk to pregnancy results from pregnancy-induced hypertension. These disorders, also known as in mild forms as pre-eclampsia and in severe forms as eclampsia, resolves once the pregnancy state end. Early signs and symptoms include a rise in blood pressure, excess protein in urine and fluid retention. Good nutrition especially an adequate (about 2 gms/day) may prevent or lessen the disorder.[35]

4.3. Nutrient needs during pregnancy:

Between the moment of conception and the moment of birth, innumerable events determine the course and outcome of fetal development and ultimately, the health of the new born infant. Each organ needs nutrients most during its own intensive growth period. A nutrient deficiency during one stage of development might affect the heart and during another stage, the developing limbs.

A woman's nutrient needs during pregnancy and lactation are higher than at any other time in her adult life and are greater for certain nutrients than for others.[37]

4.3.1. Energy: The total caloric cost of producing the foetus, the placenta and other maternal tissues and of establishing reserves is about 80,000 Kcal. For most woman an extra allowance of 300 Kcal / per day during the second and third trimester will permit satisfactory weight gain. An allowance of at least 36 Kcal per Kg pregnant weight is needed for satisfactory utilization of protein, with 40 Kcal per Kg

being an average intake.

The caloric requirement may vary as much as 800 – 900 Kcal, depending on the activity of the women. Some adolescent pregnant girls are so sedentary that their caloric need is increased by only 150 Kcal. But women who have several children and the associated household duties or women whose employment involves body movement require more than the 300 Kcal per day increase. The adequacy of the caloric requirement can be evaluated by maintaining desirable rate of weight gain.

4.3.2. Protein: About 925 gms protein is deposited in the foetus and maternal tissue during pregnancy. The rate of deposit in these tissues averages 0.6, 1.8, 4.8 and 6.1 g per day during the four quarters of pregnancy. Protein may be stored in the body at a uniform rate during the entire pregnancy and is made available to the specialized tissues as needed.

4.3.3. Minerals: The efficiency of absorption of minerals such as Calcium and Iron improves during pregnancy, but the demands of the foetus and other developing tissues necessitate increases in the diet during the second and third trimester. The full term foetus contains about 28 gms calcium. Some calcium and phosphorous deposition takes place early in pregnancy, but most of the calcification of bones occurs during the last two months of pregnancy. The first set of teeth begins to form about the eight week of prenatal life, and they are well formed by the end of the prenatal period. The 6 – year molars, which are the first permanent teeth to erupt, begin to calcify just before birth.

If the mobile reserve of calcium is lacking in the mother, the demands of the foetus can be met, perhaps inadequately, only at severe expense to the mother.

i) *Iodine*: The daily allowance of 175 ¼ g iodine is easily met by using iodized salt. If sodium restriction is required for any reason, a supplement may be prescribed.

ii) Sodium: During pregnancy the sodium requirement increases to take care of fetal needs. The enlarging maternal tissues and the

expanding blood volume. The homeostatic mechanism spare sodium loss that might otherwise occur because of the increased glomerular filtration rate.[5]

RECOMMENDED DIETARY ALLOWANCES OF A PREGNANT WOMAN

Nutrient	Normal Adult Woman	Pregnant Woman
Energy Kcal		
Sedentary	1875	+ 300
Moderate	2225	+ 300
Heavy	2925	+ 300
Protein gm	50	+ 15
Fat g	20	30
Calcium mg	400	1000
Iron mg	30	38
Retinol mcg	600	600
β-Carotene mcg	2400	2400
Thiamine mg		
Sedentary	0.9	+ 0.2
Moderate	1.3	+ 0.2
Heavy	1.5	+ 0.2
Riboflavin mg		
Sedentary	1.1	+ 0.2
Moderate	1.3	+ 0.2
Heavy	1.5	+ 0.2
Niacin mg		
Sedentary	12	+ 2
Moderate	14	+ 2
Heavy	16	+ 2
Pyridoxine mg	2.0	2.5
Ascorbic Acid mg	40	40
Folic Acid mcg	100	400
Vitamin B_{12} mcg	1	1

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Food intake during pregnancy is important, but entering pregnancy with nutrient reserves has many advantages. It provides a margin of safety if food intake is interfered with, during the early stages of pregnancy – for example, morning sickness (nausea and vomiting). The amount of each small nutrient that can be stored in the body varies from small to large. However, a well nourished body usually has a small surplus of all nutrients. This surplus can be crucial in the first trimester of pregnancy when the ability to eat is impaired by hormonal shifts and the tissues and organs of the embryo are being differentiated. This is the time when adequate nutrition is believed to help protect against some birth defects.

Good pre-pregnancy nutritional status also is an indicator of reasonably good eating practices.

Most of the health problems that occur during pregnancy can be reduced or prevented by nutritional adjustment. Among these problems are nausea, anaemia, pica, heart burn, urinary urgency, muscle cramps, bloating, toxemia and excessive alcohol consumption.

To overcome these disturbances following nutritional adjustments can be made.

- Nausea: eat dry toast or crackers before arising; drink fluid between meals only, eat no fats and oils, use skim milk.
- Constipation: eat high fiber foods such as fresh fruits, vegetables, prcences, and whole grain breads.
- Anaemia's: increase intake of iron and the vitamins associated with red blood cell formation (Folacin, B_6, B_{12} and C)
- Heart burn: eat bland foods; plan small and frequent meals.
- Urinary urgency: generally avoid consuming tea, coffee, spices and alcoholic beverages.
- Muscle cramps: increase calcium and decrease phosphorous intake.
- Bloating cramping: Plan frequent and small meals; eat no greasy foods reduce roughage and cold beverages.[38]

5. NUTRITIONAL HEALTH OF LACTATING WOMEN

Nursing mother has not only to nourish herself but also the nursing infant. The baby is born with liberal stores of iron, protein, vitamin C and other vitamins and these have to be supplied either from the mother's diet or her tissues. If the diet is lacking in the nutrients needed by the foetus they are removed from maternal stores.[39]

One of the remarkable phenomena in nutrition is that even a poor mother on a low plane of nutrition is able to nurse her infant satisfactorily at least for the first few months of life so inspite of a more satisfactory state of nutrition. But this is not justification for neglecting her own nutrition as this may be achieved at some cost to the mother. If she becomes tired and irritable as a result she is not likely to take good care of her child and provide the maternal stimulation which is so important for its development.[40]

Severe under-nutrition reduces the amount of breast milk produced. Infants born to under-nourished mothers get a smaller amount of milk.[41]

Once baby is happily established on the breast, the mother's diet is just as important as it was before the birth.

A well balanced diet is needed for milk production. The depletion of nutrients of the mother through milk has to be made good through food intake in order to protect the health of the mother.[1]

5.1. Events of Lactation:

Almost all women can breast feed their children. Major problem are usually due to a lack of information. Anatomic problems in breasts, such as inverted nipples, can be corrected during pregnancy. Breast size is no indication of success in breast feeding.

5.1.1. Producing Human Milk: During pregnancy, cells in the breast aggregate to form milk producing cells called lobules fig 3.

Hormones from the placenta stimulate these changes in the breast. After birth, the rise in the maternal production of the hormone prolactin acts to maintain these changes in the breast and in turn enhances the ability to produce milk. During pregnancy, breast weight increases by 1 to 2 pounds. The hormones prolactin also stimulates the synthesis of milk. Suckling stimulates prolactin release. Milk synthesis then occurs as an infant nurses.

Most protein found in human milk is synthesized by breast tissue. Some proteins also enter the milk directly from maternal circulation. These proteins include immune factors and enzymes, long-chain fatty acids, found as triglycerides in breast milk, are synthesized by breast tissue. The monosaccharide galactose is synthesized in the breast while glucose enters from maternal circulation. Together these monosaccharides form the disaccharide lactose, the main carbohydrate in the human milk.

5.1.2. The let down reflex: An important brain – breast connection – the let down reflex is necessary for breast feeding The brain releases the hormone oxytocin to allow the breast tissue to "let down" or release the milk from storage sites to travel to the nipple area. A tingling sensation signals the let – down reflex shortly before milk flow begins. It the let down reflex doesn't operate, little milk is available to the infant.

The let down reflex is easily inhibited by nervous tension, a lack of confidence and fatigue.[36]

Adequate nutrition of the mother supports successful lactation and without it lactation is likely to falter or fail.

5.2 Nutritional requirements of lactating women:

By continuing to eat nutrient dense food and fluid at frequent intervals throughout lactation, the mother who chooses to breastfeed her infant will be nutritionally prepared to do so. An inadequate diet doesn't support the stamina, patience and self-confidence that nursing and infants demands.

5.2.1. Food energy: A nursing mother produces about 25 ounces of milk a day, more or less depending primarily on the infants demand for milk. This milk output amounts to about 525 Kcal per day and the mothers body requires extra energy to produce it. The energy allowance for a woman during the first six months of lactation is a generous 640 Kcals a day above her ordinary need. The committee on dietary allowances suggests that 500 Kcals come from added food and the rest from the body sores of fat accumulated during pregnancy for that purpose.[40]

5.2.2. Protein: During lactation protein requirement has been computed on the basis of secretion in milk of 9.4 g per day during 0 – 6 months and 6.6 gms during 6 – 24 months which correspond to 820 ml and 600 ml of milk respectively with protein content 1.15 g / 100 ml.

Assuming a 70 percent efficiency of conversion of dietary protein into milk protein and a 25 percent of individual variation the safe daily intake will be 16.8 gm and 12.0 gm during the first six months and during 6 -12 months respectively. The nutrition expert committee has recommended, during lactation all daily intake of 25 gm the first 6 months and 18 gm during 6 – 12 months of lactation.

5.2.3. Fat: Although the total amount of fat in breast milk is not influenced by the mother's diet, the composition of the milk fat reflects the composition of mother's diet.

The requirements of linoleic acid during lactation increases 5.7 en %. Invisible fat requirement is 17.5 en % and visible fat should be 45 gm.

5.2.4. Calcium: The increased amount of calcium that was required during gestation for mineralisation of the foetal skeleton is now diverted into mother's milk production. Both during pregnancy and lactation 1000 mg has been prescribed by ICMR. The retention of calcium in lactating women is about 30 percent, hence an extra amount of 600 mg is prescribed. 500 ml of milk or milk products

should be given to lactating mother to meet 1000 mg of calcium.

5.2.5. Iron: The iron requirement during lactation remains same as adult women of 30 mg / day. The baby is born with a relatively larger reserve of iron since milk is not a good source of iron. A good allowance of iron in the mother's requirement during lactation does not convey additional iron in the mother's requirement during lactation is the sum of the requirement of the mother and that required to make up the iron lost in breast milk. Since there is amenorrhoea during lactation the basal requirement will be same as in adult woman 14 mðg / Kg.

5.2.6. Vitamin A: The quantity of Vitamin A present in 650 ml of human milk is 300 mcg, so the ICMR recommends an additional allowance of 350 mcg of retinol. This can be achieved by including liver, fish liver oils, egg yolk and green leafy vegetables in the diet.

5.2.7. Vitamin B: As calorie and protein requirements are increased during lactation, B-vitamin requirements are also increased. Additional B-vitamins are required for the amounts that are present in human milk.

Recent studies have shown that thiamine content of breast milk in poor mothers in rice eating areas is lower than that of a well to do mothers. Supplementation to such mothers with thiamine was shown to increase the concentration of this vitamin in the milk. Thus deficiency of thiamine in the diet may affect not only the adult but may have repercussions also on the nutrition of the breast fed infants.

In lactating women blood folate levels drop constantly, reflecting the stress imposed by maintaining folate content of breast milk at approximately 25 mðg /day. An additional allowance of 50 mðg of folate could be provided during lactation.

The amount of vitamin B_{12} secreted in milk per day is 0.25 ÷ 0.3 mðg. An additional intake of 0.5 mðg /day would cover the needs during lactation.

If the diet meets the requirement of protein and calcium the

requirement of riboflavin would be met. Milk is not only a good source of calcium but also a good source of riboflavin.

5.2.8. *Vitamin C:* The additional needs during lactation are calculated on the basis of the vitamin C secreted in milk. Assuming a daily milk secretion of 700 ml milk with an Ascorbic Acid content of 3 mg / dl by well nourished women, the additional requirement during lactation will be 20 mg. taking into consideration of the cooking losses (50%) the committee recommends an additional intake of 40 mg per day during lactation.

5.2.9. Fluid: An increased intake of fluids is necessary for adequate milk production, since milk is a fluid tissue. Water and beverages such as juices, tea, coffee and milk all add to the fluid necessary to produce milk.(42)

RECOMMENDED DIETARY ALLOWANCES OF A LACTATING MOTHER

Nutrient	Normal Adult Woman	Lactating Mother	
		0-6 Months	6-12 Months
Energy Kcal			
Sedentary	*1875*	*+ 550*	*+ 400*
Moderate	*2225*	*+ 550*	*+ 400*
Heavy	*2925*	*+ 550*	*+ 400*
Protein g	*50*	*+ 25*	*+ 18*
Fat g	*20*	*45*	*45*
Calcium mg	*400*	*1000*	*1000*
Iron mg	*30*	*30*	*30*
Retinol mcg	*600*	*950*	*950*
β?Carotene mcg	*2400*	*3800*	*3800*
Thiamine mg			

Thiamine mg			
Sedentary	*0.9*	*+ 0.3*	*+ 0.2*
Moderate	*1.1*	*+ 0.3*	*+ 0.2*
Heavy	*1.2*	*+ 0.3*	*+ 0.2*
Riboflavin mg			
Sedentary	*1.1*	*+ 0.3*	*+ 0.2*
Moderate	*1.3*	*+ 0.3*	*+ 0.2*
Heavy	*1.5*	*+ 0.3*	*+ 0.2*
Niacin mg			
Sedentary	*12*	*+ 4*	*+ 3*
Moderate	*14*	*+ 4*	*+ 3*
Heavy	*10*	*+ 4*	*+ 3*
Pyridoxine mg	*2.0*	*2.5*	*2.5*
Ascorbic Acid mg	*40*	*80*	*80*
Folic Acid mcg	*100*	*150*	*150*
Vitamin B_{12} mcg	*1*	*1.5*	*1.5*

ICMR: 1989

Section - C

(Studies on Nutrition)

1. STUDIES ON NUTRITION

1.1 STUDIES RELATED TO NUTRITIONAL ANTHROPOMETRY

Leela M.Sai / Busi B.R., (1995) studied the effect of physiological state such as pregnancy, lactation or NPL state on the nutritional status of women. The study comprised of 726 Andhra women from low to middle groups. The nutritional status of women was studied by anthropometry, dietary and clinical methods. The results indicate that the women in the state of lactation are too burdened during which their body measurement showed lower values, the dietary intakes were only 50% adequate and the incidence of nutritional deficiencies is also high as indicated by high mean nutritional deficiency scores. Among lactating women the women experiencing amenorrhoea are worse as indicated by all these parameters.[43]

To find out the degree of current under-nutrition in rural reproductive age women, 49 villages of two adjoining rural block of Varanse 6130 Non-pregnant and non-lactating rural women in the age group 18-45 years were studied by Srivastava M. et al (1998) for socio-demographic characteristics and anthropometry, i.e. weight, height and mid-arm circumference. Their percentiles for age and for weight for height were calculated by using cubic spline method. The women in 90th centile weighed < 38 Kg and those in > 90th cantle weighed 47 – 48 Kg; 74.2% had weight < 45 Kg. The 50th centile and 90th centile values were around 22 and 24 cm, respectively. Mid-arm circumference and height had significant linear correlation with weight. Around 50% rural U.P. women in pre-pregnancy state are undernourished. With age these rural women did not change in weight or mid-arm circumference.[44]

In NFHS-2 (1998-99) ever married women 15 – 49 years were evaluated the mean BMI for women in West Bengal was found to be 2 Kg/m^2 varying within a narrow range of 18-23 for all age groups.

44% of women in West Bengal have a BMI below 18.5 Kg/m^2, indicating a high prevalence of nutritional deficiency. Nutritional problems, as indicated by BMI, are particularly serious for women age 20 – 29, rural women, illiterate women, women who are not Hindu or Muslim, women in scheduled castes and scheduled tribes, women who are employed by someone else or who work on a family farm or in a family business, and women from households with a low standard of living. It was found that education and the standard of living are strongly related to chronic energy deficiency. Illiterate women and women with a low standard of living are more than three times as likely to have a low BMI as women who at least completed high school and women from households with a high standard of living.

In West Bengal, the haemoglobin levels were tested for 92% of women, compared with 88% of women in India as a whole. Overall, 63% of women have some degree of anaemia. 45% of women are mildly anaemic, 16% are moderately anaemic and 2% are severely anaemic. The prevalence of anaemia is higher for breast feeding women than for other women, but there is also a difference in the prevalence of anaemia between pregnant women and Non-pregnant women who are not breast feeding. However, pregnant women have a much higher prevalence of moderate anaemia 26% than Non-pregnant women 14 – 19%.[45]

In order to identify differences in growth and nutritional status between early (upto 17 years old) and late (17 to 19 years old) adolescent mothers during pregnancy and to measure the risk to have an intrauterine growth retardation (IGR : birth weight < 10 degree percentile) a retrospective longitudinal study was carried out by Bolzan A. et al (1999) in 300 adolescent pregnancies. Nutritional status was estimated according to the body mass index measured during the first (< 20 weeks) and last (> 33 weeks) prenatal-control and by the weight gain during pregnancy. When a mother had a weight gain < 25 degree percentile she was considered at risk to have an IGR. Neonatal anthropometry included birth-weight, recumbent

length, cephalic perimeter and body mass index. Comparison between both groups of mothers was performed by one way ANOVA and Mantel Haenszed stratified procedure. Odds – ratio was also calculated. Results showed no statistically significant differences in growth between both early and late adolescent pregnancies and between both groups of new borns. When a mother had a weight gain < 25 degrees percentile the relative risk to have an IGR increase upto three times (O.R. = 2.71 I.C. 95% : 1.31/ 6.45). There were highly significant differences in growth between new borns from mothers at risk and from mothers not at risk ($P < 0.01$). The study showed that the risk to have an IGR is significantly related to nutritional status and not to age itself in adolescent pregnancies.[46]

Saxena Vartika et al (2000) studied 400 pregnant women upto to 28 weeks of gestational age. All the women were followed up at four weekly interval for the assessment of weight gain, however some women defaulted hence, follow up of all women at periodic interval was not possible. All the women were clinically examined. Their height was measured up to nearest 1 cm, and weight upto nearest of 0.5 Kg. Hb. level was estimated by Sahli's method . Dietary intake was assessed by oral questionnaire method for one dietary cycle. The same procedure was reported on subsequent visits of pregnant women till termination of pregnancy. The Hb level less than 11 gm/dl at time of registration of women was used for classification of under-nutrition. Prevalence of iron deficiency and iodine deficiency were assessed on the basis of pallor in the lower conjunctiva and presence of neck swelling diagnosed as goitre using the criteria for the diagnosis of goitre.

On the basis of clinical signs and symptoms 36.3% women were found to be having iron deficiency, 2.0% women reported history of night blindness, 1.5% women had shown clinical evidence of iodine deficiency. Overall 23.3% were having BMI < 18.5 Kg/m^2. Majority of women (72.5%) were having BMI in the range of 18.5 – 25. 0 Kg/m^2. 38% women were found to be suffering from anaemia. Out of

which 3.7% women were severely anaemic (Hb < 6.5gm/dl). 22.8% and 11.5% women were suffering from mild and moderate degree of anaemia respectively. Average weight gain among those delivering upto 40 weeks and beyond was 5.4 Kg and 6.6 Kg respectively. Overall 29.5% women were not taking adequate calories.(10)

For some women, postpartum retention of weight gained during pregnancy may contribute to obesity. A recent 10 – week randomized intervention (at energy metabolism Lab, Jean Mayer USDA Human Research Centre on Aging Tufts University, Boston USA) showed that infants of initially overweight lactating mothers who exercised and dieted to lose an average of 0.5 kg/week grew normally. The findings of this study support the Institute of Medicine guidelines for weight loss in overweight women who are exclusively breast feeding their child. (47)

De Paoli I R et al (2001) evaluated the effectiveness of the indicators. Pre-pregnancy weight and pre-pregnancy body mass index in the categorization of the nutritional state of the pregnant women. The study was formed by 109 pregnant women. They were evaluated in the first trimester of pregnancy at the "Centro do Attention Nutritional Infantile Antimano". In each one of them the Nutritional state was classified according to three criteria: integral nutritional diagnosis,, pre-pregnancy weight and pre-pregnancy BMI. For the evaluation of effectiveness of diagnosis criteria, the other two approaches were compared with the integral nutritional diagnosis. The analysis of the frequency, sensibility, specificity and predictive values were applied. The integral nutritional diagnosis showed: 75.2% (n = 82) well nourished and 14.8% (n = 27) under-nourished the sensibility of pre-pregnancy weight was 0.93 and of the pre-pregnancy body mass Index was 0.52, with a positive predictive value of 0.60 and 0.82 respectively. The specificity of the first indicator was 0.79 and of the second was 0.96, with negative predictive value of 0.97 and 0.86 respectively. The pregnancy weight demonstrated to be effective to under-nourished women.(48)

Winkvest A (2003) found that women in affluent societies retain some weight with each pregnancy, beyond that of non – pregnant women. Women in less affluent societies retain less weight with each pregnancy. During lactation, women in both affluent and less affluent societies experience only modest weight loss. During the NP/NL interval, women in affluent societies tend to gain weight, whereas weight of women in less affluent societies is likely to fluctuate.[11]

1.2 STUDIES RELATED TO DIETARY OR NUTRIENT INTAKE

Kaur Malkit (1985) reported that ninety young women in the age group of 16 to 20 years from the women hostel of Punjab Agricultural University, Ludhiana were selected to assess their nutritional status. The subjects were classified into three groups of 30 each on the basis of their haemoglobin and food habits i.e. anaemic vegetarian (AV), anaemic non-vegetarian (ANV) and non-anaemic (NA) group.

The mean daily intake of pulses, roots and tubers, other vegetables, meat, fish and egg, milk and milk products, sugar and jaggery, fats and oils among the subjects of the AV, ANV and NA groups was adequate as compared to RDI (ICMR, 1984). The intake of cereals and green-leafy vegetables was, however, inadequate. The seasonal differences in the average daily intake of pulses and other vegetables were significant ($p < 0.05$). The mean daily energy, iron and zinc intake was inadequate while the intake of protein, calcium, copper, cobalt, phosphorous and ascorbic acid was sufficient in all the groups.. The seasonal differences in the average daily intake of protein were significant only in the NA group. The ionizable iron was 5.97 to 7.06 per cent of the total iron in the diets consumed by the subjects in both the seasons and was comparatively higher in the diets of ANV group.

The average weights and heights of the subjects were normal.

The mean mid-arm circumference values of the subjects were between 80 to 90 percent of standards, while the mean triceps skin fold thickness value was more than the standards.

The average haemoglobin (Hb) levels of the subjects of AV, ANV and NA group was 10.4 ± 0.11, 10.7 ± 0.13 and 12.5 ± 0.10 g/dl respectively. The average packed cell volume among the subjects of all the groups was within the normal range while mean corpuscular concentration value was significantly high among the subjects of NA group as compared to other two groups. The mean serum iron values were 81.2 and 123.1 mðg/dl in the anaemic and non-anaemic group and was in the normal range. The corresponding figures for total iron binding capacity and per cent transferrin saturation were 534, 306 mðg/dl and 16.1, 40.5 percent respectively confirming iron deficiency in the anaemic subjects. The data also indicated that malaria and menstrual flow affected significantly ($p < 0.01$) the blood iron status of the subjects.

The respiration frequency (RF), pulmonary ventilation rate (PVR), oxygen consumption and energy expenditure during cycling was higher in the anaemic group by 15.07, 11.65, 28.57 and 28.68 per cent respectively as compared to non-anaemic group. On the other hand there was an increase of 17.13 per cent in the mechanical work done in case of non-anaemic subjects which perhaps was associated with better iron status of the non-anaemic subjects.

Statistically, positive and highly significant ($p < 0.01$) correlation coefficients were found between dietary energy and protein. The coefficient of correlation between Hb and mechanical workout was positive and highly significant ($p < 0.01$). However, the coefficient correlation of Hb, RF, PVR and energy expenditure were negatively and significantly ($p < 0.01$) correlated confirming the adverse effect of iron deficiency anaemia on physical work performance.[49]

The dietary nutrient intake of persons aged 10-72 years (23 males and 30 females) was investigated by Kazuko Hiraj et al (1994) using the 24-hour recall method living in Southeastern Nepal. The mean

daily consumption of food averaged 433 and 437 gm of cereal, 25 and 20 gm of fat, 59 and 60 gm of coloured vegetable for males and females respectively.. For the majority of subjects, milk and dairy product (249 and 213 g for males and females respectively)was almost the sole source of food of animal origin. The levels of energy intake (2427 and 2275 Kcal for males and females respectively), protein (63.0 and 57.3g), and vitamin B 2.16 and 2.04 mg) were related to the level of consumption of cereal ($r = 0.89$, $r = 0.77$ and $r = 90$, $p < 0.001$, respectively) and rice ($r = 0.69$, $r = 0.50$ and $r = 0.58$, $p < 0.001$, respectively). The energy intake was supplied with 10.9 and 10.4% by protein, 18.6 and 15.8% by fat and 70.6 and 73.8% by carbohydrate for males and females respectively. The intake levels of Ca (612 and 466 mg), Fe (13.1 and 11.9 mg), and vitamin B_2 (1.06 and 0.80 mg) were correlated with the protein intake ($r = 0.57$, $r = 0.87$ and $r = 0.60$, $p < 0.001$, respectively), the daily mean intakes of vitamin A and C were 1406 IU and 101.0 mg for males and 1182 IU and 78.9 mg for females, respectively.[50]

Food quantity and quality has been studied [Menghetti E et al (1994)] in a group of 197 pregnant women during their last quarter of pregnancy. The results were that nourishment both in quantity and in quality enough close to the LARN advices, with a slight reduction of calories per day (about 300) and a slight lipa excess (+ 5%) to the depriment of the carbohydrates. Correct was the number of meals per day (4-5) while the "Mediterranean diet" has been kept by the 53% of subjects. Fish consumption was scanty (18%) of the cases.[51]

Baturin A.K. et al (1995) studied Nutrient and energy intake in 892 pregnant women during III trimester of pregnancy. Daily protein intake was 65-66 g and animal protein made up 60% of total protein intake. Total fat consumption was 80-81g, carbohydrates intake was 240-250g. Total energy intake in Ekaterinburgs and Moscow's pregnant made up 2031 and 1978 Kcal respectively. Body mass gain from I to III trimesters have formed about 9 Kg or 0.41 Kg per week.

Body mass index (BMI) averaged 25.1 and 25.7 in Ekaterinburgh's and Moscow's pregnant on day of survey. About 2.5% of women had BMI lower than 19.8. The results were compared with data of developed countries and conclusion was made about sufficient energy and macronutrient intakes, but fat intake was moderately high and formed 33-35% of total energy.(52)

Ivanova L (1995) studied the influence of dietary intakes during I and III trimester of pregnancy on iron status and anaemia incidence in 44 healthy pregnant women. More than 70% of the women studied had low dietary intake of iron during pregnancy, but only 21% were anaemic. The half of women with anaemia were with iron deficient anaemia. The results of iron intake might overestimate the risk of developing iron deficiency. Iron status during pregnancy is influenced by the dietary intake and diet structure, iron body stores and adaptive mechanisms.(53)

Gorbitz et al (1995) investigated the dietary composition and followed the changes in serum lipids during pregnancy among 20 women age 25 – 36 years. The womens diet was stable during pregnancy, but the intake of vitamin D, iron and fibre was lower than the national recommendations. Fat provided about 31% of energy, saturated fat 12%. The total cholesterol concentration rose from 4.4. (95% confidence interval 4.2 – 4.6) to 7.0 *m mol/l* (6.5 – 7.5) ($p < 0.0001$) without changes in dietary composition. Even in thus group of health conscious, pregnant women the diet did not meet the national dietary recommendations. In addition the composition of fat in the diet was unfavorable.(54)

A nutritional survey of a Hungarian group of pregnant women was carried out by Antal M et al (1997); one hundred and twenty nine women aged 25.9 years, entered the study, but only 70 completed all the protocol. Average body weight gain was 12.4 Kg and the mean birth weight of the new borns was 3,386 g. Mean energy and nutrient intakes of pregnant women showed similar patterns as in Hungarian Non-pregnant women of the same age. The mean energy

intake was high (11 MJ), being 10% higher than for Non-pregnant women. The mean protein and lipid intakes were also high, 91.9g and 108.4g respectively exceeding by 7% and 6% the intakes of the Non-pregnant women. Dietary intakes of saturated fatty acids and monounsaturated fatty acids were close to 12% of energy, and the intake of polyunsaturated fatty acids was 7.6% of total energy. Palmetic acid (16.0), oleic acid (18:1 n-9) and linoleic acid (18:2 n-6) made the greatest contribution to the total peak area of SFA's MUFAS's respectively. The ratio of P/S (Polyunsaturated/saturated fatty acids) was appropriate: D.65; however, the ratio of linoleic acid (18:2 n – 6) to linolenic acid (18:3 n-3) was high : 16. The cholesterol intake was low (245g) but it was still by 75% higher than in Non-pregnant women. The excess sodium intake (6.3g) was very similar to that of Non-pregnant women. Mean values for retinol, tocopherol, ascorbic acid, cobalamine and copper intakes were higher than the Hungarian recommended dietary allowances (RDA). Thiamine, riboflavin, pyridoxine, niacin, calcium, iron and zinc intakes were insufficient. Data showed an imbalance in the energy and nutrient intakes of Hungarian pregnant women, and this could be harmful for both the mother and pregnancy outcome.[55]

A study was taken by Wu B et al (1998) to see the improvement of the intakes of various nutrients including protein, fat, carbohydrate, fibres, calcium, iron, zinc et al in pregnant women after appropriate diet consultation by doctors. 100 cases of pregnant women attending diet consultation clinics were randomly selected in which, 50 cases came for the first time and another 50 cases (study group) were for the third visit at least. The diet consultation of the study group after the second consultation were compared with that before consultation and with concurrent control group. After diet consultation, except for retinol the intake of various nutrients, including calorie intake, protein, fibers, magnesium, calcium, phosphorous, iron, zinc, vitamin E, riboflavin, thiamine, nicotinic acid, in study group were significantly improved compared with that of the study group before diet consultation and of the control group ($p < 0.01$). Hence it was

concluded that diet consultation plays excellent role in promoting scientific and appropriate nutrient intake of pregnant women.[56]

Roglska Niedzwiedz M et al (2000) studied nutrition of pregnant women in Lubuski district and reported that nutrition in the third trimester in women from small town in Lubuski district was improper. Energy, minerals and vitamins intake bellow safe levels of the Polish RDA, only fat intake was above. Women with low protein intake (below 90% safe level of Polish RDA) consumed simultaneously significantly less energy, minerals and vitamins (except vitamin A, E and B_{12}) in comparison to women with proper level of protein in diet. Women with low protein intake were generally unemployed, had two or more children and low educational level.[57]

Claudia de Mello Meirelles (2001) compared the dietary and anthropometric profile of 24 ovo-lacto vegetarian and 36 omnivorous female adolescents, between 15 and 18 years old. Weight, height and skin folds were measured. Food frequency questionnaires and a three day food record were used for dietary assessment. Vegetarians presented sub-scapular, suprailiac and mid-axillary skin-folds. Statistically higher than omnivorous, but the percent body fat was not different. The vegetarian diet provided smaller amounts of energy than that of the omnivores ($p < 0.05$) and only 17% of the vegetarians was able to reach the recommended allowances for protein. Regarding calcium 83% of the vegetarians and 69% of the omnivores ate less than 2/3 of recommended allowances and a significantly higher percentage of vegetarians presented low ingestion of iron, riboflavin, and niacin than omnivores ($p < 0.05$). It was concluded that the intake of vegetarians was lower in fat and cholesterol and less adequate in micronutrients than the omnivores ones.[58]

Department of Food and Nutrition the University of Geogria reported that in pregnant women with low exposure to lead, high intakes of calcium (> 2000mg/day) decreased the serum concentration of lead, which could potentially minimize fetal exposure to lead. This is twice the amount of Ca recommended for women during pregnancy

and approached the upper level for calcium of 2500 mg/day. The mechanism by which high Ca intake blunts pregnancy induced increases in maternal blood lead may involve decreased lead absorption the intestine or decreased maternal bone resorption with subsequent release of lead. Either mechanism could decrease maternal blood concentrations of lead and potentially limit fetal accumulation of lead.(59)

Swensen A. R. et al (2001) evaluated nutrient intake from dietary sources for 95 pregnant women enrolled in the special supplemental program for women, infants and children (WIC). Women were recruited from Minneapolis and St. Paul area WIC clinics between January and June 1999. Based on estimates from the WIC clinics, the study was described to 159 (63%) of the 251 potentially eligible women. Of these 159 women, 107 (67%) completed the in-person interview. Ninety five (89%) were included in the nutrition analysis. Each woman completed a 1 – hour in-person interview that included a questionnaire, anthropometric measurements and a venous blood sample. A shortened Block 98 food frequency questionnaire was used to assess dietary intake. Serum ferritin was measured was measured for 86 women; Means medians and standard deviations of dietary intake were explored as well as body mass index distributions. Additionally, the percentage of women consuming less than two-thirds of the recommended dietary allowances (RDA) for certain nutrients was calculated. Overall, the women reported consuming only 85% of the RDA for energy. The average percentage of energy from fat was higher than recommended (37%) Vs (30%). The most notable nutrient shortfall was iron, 90% of the women reported consuming less than 2/3 of the RDA. Additionally, serum ferritin analysis classified 22% of the women with iron deficiency anaemia < 12 *mg/l*.(60)

Jood S (2002) carried out a study to determine average daily food intakes of 90 rural pregnant women belonging to arid, semi-arid and wet zones of Haryana State, Northern India. As a result of

questionnaires and interviews food intake for three consecutive days were collected. Intakes of cereals, pulses, roots and tubers, other vegetables and sugar and jaggery by the respondents were significantly lower than the prescribed Indian RDI. The consumption of milk and milk products and fats and oils was significantly higher than RDI whereas, green-leafy vegetables and fruits were the most limited food items. As the diets of rural pregnant women were inadequate with respect to some food groups which resulted in lower intake of protein, bð-carotene and Ascorbic Acid. Despite their poor intake there weights and heights were not much below the standards, BMI classification projected that only about one-fourth of the respondents were underweight.(61)

Backstrand J. R. et al (2002); found that higher plasma ferritin concentrations were associated with greater intakes of non-heme iron and ascorbic acid after control for age, BMI, breast feeding, season, and the time since the birth of the last child. Higher ascorbic acid intakes, but not higher intakes of heme and non-heme iron, predicted a lower risk of low haemoglobin and hematocrit values after control for the background variables. Consumption of the alcoholic beverage pulque predicted a lower risk of low ferritin and low haemoglobin value. Seasonal variation in ferritin, haemoglobin and hematocrit values was observed.(62)

Ma A et al (2002) examined the relationship between iron status and dietary nutrients, through a cross sectional study in pregnant women. The intake of foods and food ingredients were surveyed by using 24–hour dietary recall. Blood haemoglobin, haematocrit, serum iron, serum ferritin, transferrin and soluble transferrin receptor were measured in 1189 clinically normal pregnant women in the third trimester of pregnancy. The result showed that the average daily intake of rice and wheat was 504.2g in the anaemia group and 468.6g in the normal group. Carbohydrates accounted for 63.69% and 63.09% of energy in the anaemia and normal groups, respectively. Intake of fat was very low; 18.38% of energy in anaemia group and

19.23% of energy in normal group. Soybean intake was 109.4 g/day and 63.6 g/day in the anaemia and normal group, respectively ($p < 0.001$). There were lower intakes of green vegetables (172.1 g/day) and fruits (154.9 g/day) in the anaemia group than in the normal group (246.2 g /day green vegetables ($p < 0.001$) and 196.4 g/day fruit ($p < 0.001$). Intakes of retinol and ascorbic acid were much lower in the anaemia than in the normal group ($p < 0.001$). In the anaemia group, vitamin A intake was only 54.76% of the Chinese recommended daily allowance (RDA) and ascorbic acid intake was 53.35% of the Chinese RDA. Intake of total vitamin E was 14.55 mg/day in the anaemia group compared with 17.35 mg/day in the normal group ($p < 0.016$). Moreover intake of iron in pregnant women with anaemia was slightly lower than that in the serum iron in women with anaemia at 0.89 micro g /*l*, which was significantly lower than 1.09 micro g /*l* in the normal group ($p < 0.001$). There were lower average values of ferritin (14.70) micro g /*l* and transferrin (3.34 g /*l*) in the anaemia group than in the normal group (20.40 micro g /*l* ferritin ($p < 0.001$) and 3.44 g /*l* transferrin ($p < 0.001$). Soluble transferrin receptor was significantly higher (32.90 n mol /*l*) in the anaemia than in the normal group (23.58 n mol /*l*; $p < 0.001$). The result of this study indicate that anaemia might be attributed to a low iron intake, a low intake of enhancers of iron absorption and a high intake of inhibitors of iron absorption from a traditional Chinese diet rich in grains.[(63)]

Hernandez et al (2003) showed that women randomized to the calcium supplements experienced a small decline in blood lead levels (overall reduction of 0.29 mðg/dl; 95% confidence interval = -0.85 to 0.26). The effect was more apparent among women who were compliant with supplement use and had high bone lead levels (patella bone lead > or = 5 microgram/gm bone). Among this subgroup, supplement use was associated with an estimated reduction in mean blood lead of 1.16 mðg/dl (95% confidence interval = 2.08 to – 0.23), an overall reduction of 16.4%.

Among lactating women with relatively high lead burden calcium

supplementation was associated with a modes reduction in blood lead levels.[64]

Takimoto H et al (2003) carried a study to describe the nutritional status in Japanese pregnant and lactating women at a national level, through a comparison with their Non-pregnant/non lactating controls. Data on 330 pregnant and 388 lactating women and their one – by one matched Non-pregnant non-lactating controls showed that there were fewer smokers, drinkers and exercisers in pregnant women compared to their controls ($p < 0.01$). Both pregnant and lactating women showed significantly higher intakes of carbohydrates, calcium and vitamin B_2. Mean iron intakes ranged 10.3 – 11.5 mg. in four groups, all being lower than the recommended intake level of Non-pregnant / non-lactating women (12mg/day). Pregnant women consumed more fruits, milk and milk products, and less alcohol beverages and fish/shellfish compared to controls. Lactating women consumed more grain, vegetables, milk and milk products and less alcohol beverages. There were 22.9% anaemic subjects (Hb 11g/dl) in pregnant women, and 11.1% anaemic subjects (Hb < 12g/dl) in lactating women and 15.7% in Non-pregnant/ non-lactating women. None of the pregnant subjects was severely anaemic (Hb < 8g/dl). No significant differences were observed in iron intakes between anaemic and non-anaemic women in each group.[65]

1.3 Studies related to nutritional deficiencies:

A study was carried out by Satija Vidula (1985) for partial fulfillment of M.Sc. degree in Food Nutrition conducted on 20 nursing mothers from middle and low socio-economic groups for a period of five months after child birth. The nutritional intake of the mother, change in anthropometric measurements, amount of breast milk produced per day and the rate of growth of infants, were observed at definite intervals.

The study showed that the diet of lactating mothers from both the income groups was deficient in major nutrients, minerals and

vitamins. The deficit was more in case of mothers from low socio-economic group. The weight, arm circumference and skin fold thickness of the mothers from both the groups decreased significantly. Surprisingly, colostrum was fed to the infants by majority of the mothers. A shorter period of satisfactory lactation was observed in both the groups. The amount of breast milk produced per day increased from first to fifth month in the middle socio-economic group. Whereas the amount decreased after third month in low socio-economic group. Very few mothers from both the groups could feed more than 700g breast milk / day. Early initiation of supplementary feeds was observed in both the income groups, the major reasons being mothers' convenience and insufficiency of breast milk. The rate of growth of infants from middle socio-economic group was within the normal range but the low socio-economic group infants showed a slower rate of growth. There was no influence of mothers' diet on the amount of breast milk.[(66)]

According to NIPCCD report (1992) over half the pregnant women in the world have a haemoglobin level indicative of anaemia. For developing countries, the figure rises to 55%, or to 60%, if China is excluded. Even among the much better nourished populations of the developed countries nearly one in every five pregnant women is anaemic.

The picture is slightly better for Non-pregnant women. Neverthless, over one-third of all women in the world suffer from anaemia. In developing countries the equivalent figure is as high as 44% (very slightly more if China is excluded) and 13% in developed countries. The situation is particularly acute in parts of Asia. In Southern Asia a populous area including Afghanistan, Bangladesh, India and Pakistan, which account for 29% of the worlds births, there are 24 million women who are both pregnant and anaemic. This indicates that three quarters of all pregnant women in the region are at an increased risk of obstetric complications and hence of maternal death. Not surprisingly, 58% of these same women are anaemic even

when not pregnant. In 1985-86 a national study of nearly 4000 pregnant women in India, found a mean Hb level of 90 g /l with 88% of pregnant women having a Hb level below the norm of 11.0 g /l.

In Africa as a whole, one half of all pregnant women are anaemic, as are over 40% of Non-pregnant women. In Latin America overall prevalence is somewhat lower, at nearly 40% for pregnant women and 30% for Non-pregnant women.

Levels in the developed countries are also surprisingly high, with an average of 18% pregnant women and 12% of Non-pregnant women anaemic.[67]

Sachdeva R/Manon S.K. (1994); studied sixty-six young women from low and lower-middle income groups selected from 8 villages of Ludhiana district in the first trimester of pregnancy were divided equally into experimental (E) and control (C) groups, out of which only 60 subjects reached to the term. Folefer and calcium tablets were supplied to E group from second trimester till delivery along with regular medical supervision and nutrition education about additional nutrients needs. Intake of all the nutrients were less than the Recommended dietary Allowances in the E and C groups during the third trimester. However, the requirement of iron, calcium, folic acid, vitamin B_{12}, Vitamin D and ascorbic acid were met in group E due to supplementation. The Fe, Ca, and Cu levels improved significantly during the third trimester in E group. The cord serum levels of Fe, Ca, and Cu were also significantly higher in group E. The relationship between maternal and cord blood levels of Fe, Ca and Cu were also significantly higher in group E. The relationship between maternal and cord blood levels of Fe, Ca, Cu and Zn were significant, the coefficients of correlation being 0.67, 0.92, 0.97 and 0.43 respectively. Serum Mn had an insignificant correlation with other minerals. The results indicated that 86.7, 94.7 and 44.8% variation (r^2) in cord serum Ca, Cu and Fe levels was determined by the corresponding maternal serum levels. They concluded that regular medical supervision, supplementation and nutrition education

significantly improved the nutriture of pregnant women and their neonates.(68)

Directorate Health Services Bhutan (1994-95) study analyzing the haemoglobin test results for 4887 pregnant women attending the National Referral Hospital in Themphu showed that only a quarter of the women had an acceptable concentration of haemoglobin. The proportion of women with haemoglobin levels less than 12g/dl (the cut off point for Themphu's altitude) was 78% in 1994 and 76% in 1995. For Non-pregnant women between the ages of 15 and 45 years, the prevalence of IDA was 21% according to a nationwide nutrition survey in 1989 covering 1367 women.(69)

In Sri-Lanka, the Family Health Bureau 1994 nutrition and health survey found that the percentage of non–pregnant women with haemoglobin levels below 12 g/dl was highest in the estate sector (59.4%) and lowest in the urban sector (39.7%) with the rural sector between the two 46%.(70)

Brunvand L et al (1995) carried a cross-sectional study in women in 18th week of pregnancy. Thirty-eight Pakistani women and 38 Norwegian women referred to routine ultrasound examination at Aker and Ulleval Hospitals in Oslo participated. Analysis was undertaken of phytate (Inositol hexophosphate) and its degradation products in bread and chapatti. Twenty-six (68%) of the Pakistani and six (17%) of the Norwegian women had ferritin levels below 12 micro g/*l* and a highly significant difference in serum ferritin was found between the groups ($p < 0.001$). Only one of the Pakistani and seven of the Norwegian women were supplemented with iron, non-hem iron, organic fibre, tea, ascorbic acid, meat or cereals. The content of inositol hexaphosphate (phytate) inositol phosphate well know inhibitors of iron absorption were measured in bread and chapatti and the estimated dietary intake was much higher in the Pakistani group, mean (95% CI) was 1175 mu mol/day (933 – 1417) and 507

mu mol/day (417-597) respectively, $p < 0.001$. Hence it was concluded that the main reason for high incidence of iron deficiency among pregnant Pakistani in Norway than among pregnant Norwegians may be because of the fact that there is a combination of higher parity and a less common use of iron supplementation in pregnancy in the Pakistani group and a higher content of phytate in Pakistani diet.[71]

O. Keefe et al (1995) observed that in a study designed to estimate the requirement of dietary folate in Non-pregnant women, 17 women (21-27 y) consumed 200, 300, or 400 micrograms/day of total folate for 70 d which was provided by low folate conventional food (30 micrograms) plus supplemental folic acid. Group means for initial serum and erythrocyte folate and plasma homoeysteine concentrations were not significantly different. Serum and erythrocyte folate decreased relative to the initial value in the 200 micrograms/d group (43.4+/-12.1%, 13.6+/-16.6%, respectively, mean +/-SD), in contrast to an increase in the 400 micrograms/d group (16.8+/-52.0%, 10.2+/-18.5% respectively). The final folate in the 200 and 300 microgram/d group (6.4+/-0.8 n mol /*l*, 7.3+/-1.1 n mol /*l*, respectively) was significantly lower than that of the 400 micrograms/d group 14.3+/-2.0 n mol /*l*), with evidence in the 200 micrograms/d and 300 micrograms/d groups of low (< 6.8 n mol /*l* serum folate concentrations. Difference in final erythrocyte folate did not reach statistical significance, although low value (< 362 micrograms/d group, plasma homocysteine was negatively correlated with serum and erythrocyte folate, and final mean plasma homocysteine (12.6+/-1.7mu mol /*l* was significantly higher than that of the 300 or 400 micrograms/d group. Elevated plasma homocyteine levels (> 16 mu mol /*l* were observed in the 200 micrograms/d group only.[72]

In Nepal the micro nutrient survey (1996) showed that prevalence of nutritional anaemia in women was 67.7%, with pregnant women

having a higher prevalence (74.6%) than Non-pregnant women (66.7%).[73]

Mackey A.D. et al (1998) assessed longitudinally the nutrient intakes of lactating women during the post-partum period. Dietary data from lactating women were collected by means of 2 day food records at 3 and 6 months postpartum. Mean energy intakes were below the recommended dietary allowances. Mean intakes of most nutrients met or exceeded recommended standards except for zinc and vitamins D and E at both 3 and 6 months postpartum. Calcium and folate intakes were also below standards at 6 months. Although mean iron intake exceeded the standard at both measurement times, there was a significant decline from 3 to 6 months. Relative frequencies of months meeting various percentages of standards differed significantly from 3 to 6 months for calcium; iron, folate; and vitamins E, D and B_6. At 6 months, significant increases were noted in the number of women reporting calcium, folate, and vitamin B_6 intakes at less than one half of the recommended amounts.[74]

In pregnancy the additional demands for iron are thought to be met principally through increased maternal dietary absorption and by mobilization of maternal iron stores. In a general population sample of 576 women Robinson S. et al (1998) examined the maternal and dietary characteristics which influence iron stores (assessed by serum ferritin concentration) in early pregnancy. The effects of these characteristics were lower in multiparous women ($p < 0.0001$) and in those with a lower BMI ($p = 0.01$) and those with increased alcohol intake ($p < 0.0001$) the proportion of women with serum ferritin values < or = 12 micrograms/*l* rose from 14% of the women in the lowest quarter of Ca intake to 29% of the women in the highest quarter. Mean cell volume and Hb concentration were not related to Ca intake in early pregnancy. Although Ca added to test meals reduces iron absorption. Long term Ca supplementation has not been shown to

lower plasma ferritin concentration. Suggesting that high habitual Ca intakes would be unlikely to influence iron status in Non-pregnant individuals. The above findings show that in early pregnancy there is an association between high dietary calcium intake and lower Fe stores. This effect of Ca on one aspect of Fe-status may result from its influence on Fe bioavailability.[75]

The frequency of anaemia, iron deficiency and iron body stores was assessed by Fujimori E et al (1999) in 155 pregnant teenagers of low socioeconomic status in prenatal care unit of a beneficent hospital in Sao Paulo, Brazil. By the criterion of the WHO (Hb<12g/dl) 14.2% of pregnant adolescents had anaemia. The iron deficiency diagnostic by saturation of transferrin < 16% and zinc protoporphyrin concentration > 60 (mol/mol) hence were 45.8 and 42.6% respectively. The iron body store (serum ferritin < 12 micrograms /*l*) was depleted for 48.4% of adolescents. It is concluded that the iron nutritional status of these adolescents were characteristics of pregravidic inadequate iron store. Despite low percentage of the anaemia, the high frequency of iron deficiency and depletion of iron supplementation in teenagers.[76]

Kapil U et al (1999) studied micronutrient deficiency disorders among pregnant women in three urban slum communities of New Delhi prevalence of anaemia, IDD and VAD amongst pregnant women was 78.8%, 22.9% and 4.8% respectively. 10% of the pregnant women had cocomitant presence of all three MDDS. Pregnant women having combined prevalence of IDD and anaemia. IDD and VAD, and VAD and anaemia was 15.1%, 0.18% and 2.69% respectively. 99% of the pregnant women were consuming salt with iodine content of more than 15ppm which was recommended at household level. Results on dietary intake showed that 18%, 34%, 85% and 57% of the pregnant women were consuming less than 50% of calories, proteins, iron and bð-carotene respectively as compared to their RDA. 40% of the

pregnant women were suffering from various morbidity conditions on the day of survey. Hence it is concluded that the prevalence of micronutrient deficiencies amongst pregnant women of urban slum communities is high.(77)

Rahman S et al (1999). The health and nutritional status of many urban slum dwellers in the developing world is said to be deteriorating. The nutritional profile of 328 adults, Non-pregnant women from the slums of Dinajpur, Bangladesh, confirms this. Results of a cross sectional survey showed that approximately half the women were acutely malnourished and all but six were anaemic. This, despite the fact that the slums of Dinajpur are considered relatively 'better off' than many in developing world; most families having permanent land tenureship and access to basic education and health services.(78)

A study carried out by Nucci L B et al (2001) on nutritional status of pregnant women showed over-weight nutritional status (obesity and pre-obesity) in 25% of adult pregnant women and it was associated with increased risk for several adverse pregnancy outcomes, such as gestational diabetes and pre-eclampsia. Age adjusted prevalence (and 95%CI) based on pre-pregnancy weight were: underweight 5.7% (5.1% - 6.3%), and obesity 5.5% (4.9% - 6.2%). Obesity was more frequently observed in older black women, with a lower educational level and multiparous.(79)

Additional calcium is required during lactation and several calcium regulatory factors are involved in calcium balance in lactating rural women who have marginal nutrition and consume a high fibre diet, negative calcium balance may be expected. Desantnago S et al (2002) evaluated calcium balance and its association with potential calcium regulatory factors in lactating rural Mexican women who had marginal nutrition and consumed a high fibre diet. This cross sectional study included women at 1, 3, 6 and 12 months of lactation

(L1, L3 and L12 groups) and women who had weaned their infants (W group). Age matched, non-lactating women (NL group) were also included. Calcium balance and concentrations of calcium regulatory factors were determined, correlation analysis was performed by using data from all of the lactating women. Calcium balance in the L1, L3 and L6 groups was negative and was significantly different ($p < 0.05$) from that in the W and NL groups. Serum parathyroid hormone (PTH) and 1, 25 dihydroxy vitamin D concentrations were significantly higher ($p < 0.05$) in W group than in the L and NL groups. Calcium balance was positively associated with serum estradiol concentrations ($r = 0.5R$ $p< 0.05$) and negatively associated with serum 1 – 25 dihydroxy vitamin D concentrations ($r = -0.52$, $p < 0.05$). Breast milk calcium concentrations ($r = 0.5$, $p < 0.05$) and negatively with serum estradiol concentrations ($r = 0.51$, $p < 0.05$). Negative calcium balance was observed during lactation in rural Mexican women who consumed a high fibre diet. Furthermore, the data suggest that the hormones estradiol and PTHrP are involved in the regulation of calcium balance and of the calcium content of milk during lactation.[80]

A study carried out by Bently M E/Griffths P L (2003) on 4032 ever – married women aged 15 – 49 from 3872 households Andhra Pradesh revealed that prevalence of anaemia was high among all women. In all 32.4% of women had mild 100 – 109.99 g/ *l* for pregnant women, 100 – 119.99 for Non-pregnant women), 14.19% had moderate (70-99.99 g /*l*), and 2.2 had severe anaemia (<70g /*l*). Protective factors include Muslim religion, reported consumption of alcohol or pulses and high socioeconomic status, particularly in urban areas. Poor urban women had the highest rates and odds of being anaemic. Fifty-two percent of thin, 50% of normal BMI, and 41% of overweight women were anaemic.[81]

Section - D

(Dietary Practice/Habits)

> "A well-planned and well-executed effort to change behaviours in ways that improve nutrition can and does make a difference."
>
> Alan Berg*

1. DIETARY PRACTICES / HABITS

Nutritional practices play a significant role in maintaining the health status of an individual. Practice permitting an adequate diet (in quality and quantity) contribute to the health of the individual. An adequate diet has a marked effect upon a person's vitality, emotional stability and enthusiasm for life and work.[18]

Good nutrition is a positive factor affecting the quality of life throughout the earlier life cycle and is to a large extent determined by food habits.[34]

Nutritional practices or habits may be defined as "The way in which individuals or groups of individuals in response to social and cultural pressures select; consume and utilize portions of the available food supply.[82]

Food habits begin with the first feeding of an infant. Feeling of dependence and love begin to be associated with food. Lifetime attitudes towards eating generally reflect early association of the way in which foods needs of a person were met. Thus, food habits are formed within the matrix of human relationship.[83]

Nutritional practices and patterns are developed by people's tendency to settle into fixed habits.[18] Food habits are the end result of all the experiences people have had with food and all the attitudes, preferences, and dislikes people have developed in relation to food.[34] The development of food habit is a very human process. We know that food is necessary to sustain life and health. But we also recognize that persons eat for may other reasons and that they seldom eat just to supply their bodies with "good nutrition". Food has may meanings, and all our food habits are intimately tied up with our whole way of life.[39]

Nutritional practices and patterns are developed by people's tendency to settle into fixed habits". Eventually they characterize regional and national eating practices either poor or good.[11] Food habits are generally classified as good when a person eats the kind

and amounts of food needed for good nutrition. Poor food habits, including eating only what a person likes, regardless of individual nutrient requirements can result in a poor nutritional status. Food habits, good or bad, however, can be an extremely powerful force in determining what a person eats. The best way to be well nourished throughout life is to develop food habits and attitudes that are conducive to the selection of a healthy diet.[34] Food habits of a community furnish presumptive evidence of the nutritional status of its population.

The nutritional status of an individual is the result of many interacting factors operating simultaneously on the individual in the physical, ecological and cultural setting of the community. Attempts to improve nutritional conditions cannot be made intelligently unless the factors other than the knowledge of nutrition which determines food choices are known and considered. The quantity of various foods consumed and the associated food practices or habits are a reflection of the economic conditions and the social, cultural and educational values of a community.

The various macro level variables which affect nutritional practices can be categorized as follows:-

Macro levels variables:-

1.1. Economic factor.
1.2. Cultural factor
1.3. Beliefs, superstitions, taboos, Attitudes and practices.
1.4. Customs and traditions
1.5. Joint family system.
1.6. Religion
1.7. Social factor
1.8. Ecological factor
1.9. Psychological factors
1.10. Education

1.11. Knowledge in nutrition

1.12. Population

1.13. Food advertising

1.14. Working women

1.15. Fast food restaurants

Embracing all these factors is the influence of women, who are the decision makers in the home.[18] The food choices that women make is also influenced by time pressure.[41]

1.1 Economic Factors:

Economic status has a definite bearing on the amount of food people eat for it is income that decides the standard of living of a family. The poor generally spend a high proportion of their income on food (in South India the poorest families spend 80% of their budgets on food, the affluent on 45%). More money generally means a better diet. As the poor enjoy some increase to additional food expenditures. In rural India when the very poor have extra income to spend, 75% of it goes for food. This percentage declines as total income increase. The upper income rural Indians spend only 34% of each additional increase of income on food.

Income levels also set the pattern of foods to be purchased and consumed. The poor spend most of it on food grains, the rich much less so. The allocation for cereals declines and that for milk products increases as household move into the middle class income levels. Also higher the income, larger is the percentage of the increase spent on fruits, vegetables and other variety food items. Thus, income is a major determinant of diet quantity and quality.[18]

1.2. Cultural factors:

Culture may be defined as the way of life of a group of people – usually of one nationality or from a particular locality. Food habits are a deeply rooted aspect of many cultures. One culture may consider food only as a means of satisfying hunger; another may consider eating

a duty; a virtue or a form of pleasure; still another may feel eating is a means of family or social sharing.[84]

One of the major factors influencing the inadequacy of the diet is certain traditions, which decide as to which food should be eaten.[85] Major importance in the whole cultural background of the family are the beliefs, superstitions, taboos, attitudes and practices about food.[86]

1.3. Beliefs, superstitions, taboos, attitudes and practices:

These factors are powerful and can pose problems in nutrition education. Family attitudes regarding health and disease influence the attitudes regarding feeding the members. Women and children are often the direct victims of discriminations in food priorities. Prevailing customs may prevent people from consuming valuable foods even when they are available. In traditional Indian society men and children eat first and women last. Men receive a large quantity of food than women.

Beliefs are crucial in the acceptance or rejection of foods. The beliefs of any community are the products of social interactions deeply entrenched environmental in the minds of that community because of deep faith. Many of the foods fads and fallacies stem from ignorance about nutritive values of foods and quantitative and qualitative requirements. Wrong beliefs and practices are the result of such ignorance.

Family attitudes towards the feeding of children and pregnant women in health and disease are often the direct cause of malnutrition. Prevailing beliefs may prevent people from consuming a valuable food even when available.

Cultural considerations control the diet in lactation. The new mother is not allowed to eat any new food, as it is believed to affect the health of child when she is feed. But she is given extra milk,

Ghee, Garlic, Jaggery water and white gourd for increasing her milk. brinjal, drumstick leaves and roasted bengal gram are avoided as they would 'dry up' the milk in the breast.

Thus many prohibitions and taboos affect the consumption of valuable food by expectant and nursing mothers.(1)

There are two general food taboos for adult women of Waluguen in Tanganyika. They are not allowed to eat eggs or twin bananas as they are supposed to lead to the risk of having twins, which is a serious misfortune. Other beliefs of consumption of eggs by women are that they may lead to irregular menstruation or disappearance of it altogether and that if a woman becomes pregnant, the child will be still born.(87)

Some of the beliefs existing in India are that papaya is believed to cause abortions. Jaggery is believed to heat up the body system.(89)

1.4. Customs and traditions:

Each family develops its own traditions in serving foods and any deviations from them can be distorting. Customs of cooking and handling food differ widely and social organization of the domestic groups varies in different societies.

From one place to another opinions differ about certain foods; the belief that a particular food is dangerous probably rests on mixture of traditional beliefs and personal experience.(1)

Women's food habits have been greatly influenced by marriage. Meals are usually planned according to the husbands likes and dislikes, super-imposing the wife's original dietary habits. If there are children, thy also alter the mothers food habits.(88)

Customs, beliefs and superstitions are forceful in the use of foods. Many of the practices which stem from culture are harmful to nutrition since they are based on false notions and ignorance.

1.5. Joint Family System:

The joint family system is an important social institution. It is a cradle of customs and tradition and the nursery of culture. Most of the food habits are formed within that joint family in the early period of childhood.(18)

Both Hindus and Muslims tend to live in joint family groups, the number of inmates in any one household may be large and constantly fluctuating. It is well known characteristic of poor Indian families to cook the same amount of food, not matter how may persons are there to eat it. Thus the total amount of food eaten by the household is more constant than the amount available for each individual.(89)

In joint families in the matter of diets of pregnant and lactating women, the mothers, mothers-in-law and grand-mothers often have authority and this tells upon nutrition of the vulnerable groups of population.(90)

Thus even the type of a family to which a person belongs influence his nutritional practices.(18)

1.6. Religion:

Almost all religions place some regulations on the use of foods. The association of a food with religion gives some clue to its importance in daily living.(5) Religion play an important role in determining the food habits of people and has to some extent influenced the general health of its followers to the better or for worse.

Among the major religions of mankind Buddhism preached effectively against the custom of eating animal food. Under the influence of Buddhist thought a large number of people all over Asia are traditionally vegetarians and refuse to take any animal food except milk under any circumstances and are happy living on heavily starch foods.

Mohammedans do not eat pork, most Hindus will not eat beef and some Hindu communities consume no food of animal origin except milk and milk products because their religion forbids the taking of life. The Jewish religion forbids pork, shell-fish and the consumption of meat and dairy products at the same meal.

1.7. Social Factor:

The social status attributed to certain food may be much more important to people than any nutritive value it contains.[11] Hence food habits in any setting are highly socialized. These habits perform significant social functions, some of which may not always be evident.

Food is a symbol of social acceptance, warmth and friendliness, people tend to accept food more readily from those persons they view as friends or allies. They accept advice about food from persons they consider to be authorities or with whom they can feel warm relationships. Persons tend to distrust foods given to them by strangers and outsiders. Emotional feelings about persons are transferred to their food. The more alien the authority figure, the more such persons are considered to be unconcerned, and their food suggestions will be considered outlandish or even harmful.[(39)]

1.8. Ecological Factors:

Individuals and populations do not live alone in nature but in association with other organisms in an abiotic environment. There exists a network of relationship of each and every part, living and non-living. Such a community of plants and animals together with environment that controls it called an ecosystem. An ecosystem is made up of two large parts. The physical environment and the biological community. The physical components of a typical natural eco-system are - energy, water, atmosphere, fire, gravity, topography, geological substraction and soil. The biological factors are green

plants, non-green plants, animals and man. The physical environment provides the energy, raw materials and living space that the biological community needs and uses for its growth and maintenance. In this context, it can be stated that a number of ecological factors –

- Availability of food
- Geographical location
- Floods, famines and wars
- Industrialization and urbanization influence the nutritional practices of various groups.

1.9. Psychological Factors:-

Knowledge of the emotional value of food is of course, much older than knowledge of its nutritive value, both in the historical and in the individual biologic organism. One of the most primordial of human urges was that of eating. When pre-historic man foraged for food, he did so to satisfy his urge to eat and to survive and not to satisfy his nutritional requirements. Food is even more meaningful to people today as a symbol of love and gratification, as a sign of emotional identification. Food may even serve as a weapon of interpersonal warfare between giver and receiver. From childhood food is treated as a symbol of emotional value rather than as a source of calories. In the infant food intake is usually associated with love, protection, pleasure and comfort.[18]

1.10. Education:

Education and enlightenment are the best vehicles of a desired change. A change in people attitude towards health and disease is most important if any lasting changes for the better have to be brought about in their food habits. A mother, somewhat informed about nutrition will not use money to buy a soft drink for her baby and will instead invest it in milk. Education is important for the people to

have good aims. Educational process may include things like providing practical suggestions for preparing foods in attractive ways. But while doing so, one must respect the likes and dislikes of a person or a community associated with a culture.

Food habits and taboos are forms of groups and not mere individual behaviour. Their alteration can therefore be achieved only by education.(91)

1.11. Knowledge in nutrition:-

In most developing countries the problem of malnutrition is not due to lack of food, as much as lack of knowledge about the foods that are available and frequently this is made more grievous by harmful traditions.

1.12. Population:

Malnutrition and uncontrolled fertility are phenomena of worldwide concern and they are closely interrelated. More babies mean more mouths to feed, with consequent malnutrition when food is scarce. Ill-fed families have high reproduction despite high pregnancy wastage.(18)

1.13. Food Advertising:

Food advertisers have successfully changed the nations food habits by appealing to people's visual and olfactory senses and psychological and cultural make-up the mass media, including newspaper and magazines, radio and television, exert a tremendous influence on the changing of old food habits and the initiation of new ones. The mass media can be very effective in persuading people to buy certain food items and change their eating behaviors.

1.14. Working women:

The increase in the number of women who work outside the home to partially or fully support their families, has meant a decrease in the amount of time spent in meal preparation, an increase in use of convenience foods, an increase in the number of meals prepared and eaten outside the home and an increase in the incidence of snacking and "eating on the run".

1.15. Fast food restaurants:

The growth and success of the fast-food restaurant has been phenomenal and is related to other societal changes, an increase in the number of women working outside the home, an increase in per-capita disposable income and an increase in leisure time for many people. More families with middle and low incomes are eating fewer meals at home and more snacks – type meals at fast-food restaurants than ever before.

Fast food choices provide many essential nutrients but are high in calories with fat supplying approximately 42 percent of the total calories. Fast-food meals generally are low in vitamin A, vitamin C, Calcium and fibre.(34)

[illegible] Working women

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7.15 Fast food restaurants

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Section - E

(Studies on Dietary Practices/Habits)

1. STUDIES ON DIETARY PRACTICES / HABITS

1.1 Studies on dietary practices:

Jean (1950) found from his studies that women's food habits have been greatly influenced by marriage. Meals were planned according to the husband's likes and dislikes, super imposed on the wife's original dietary habits. If there were children, they also altered mothers food habits.(88)

Edwards et al; (1954) reported the influence of superstitions on food habits of women. In Manning, South Carolina, there is a traditional belief that milk, eggs, fish, yellow vegetables, grape fruit, tomatoes, butter, liver and beans should not be eaten. In Anniston, Alabama the belief also extends to other foods such as bacon, yam and onions. The eating of green food appears to be a taboo during the post-partum period among women in Lovisiana. Approximately one-third of women who visit the country health department, reported that they eat only rice, potatoes and milk during the postpartum period. This may be due to the idea that green colour of vegetables might show up in the mother's milk. Fish too is widely tabooed in North Carolina, Georgia, South Carolina and Kentucky. As many as 35% of the rural Negro women apparently adhere to this practice. Comments indicated that some felt it would poison them and others stated that it would prove fatal if consumed for several weeks after child birth. The continuation of "fish and milk" was thought to be specially dangerous. Other strange ill found notions included that cheese, bananas and ice-cream will make a person sick, cooked cabbage and other "strong tasting" green will upset the stomach and "taint" the milk.(92)

Moller (1961) reported that there are two general food taboos for adult women of Waluguen in Tanganyika. They are not allowed to eat eggs or twin bananas as they are supposed to lead to the risk of having twins, which is a serious misfortune. Other beliefs of consumption of eggs by women are that they lead to irregular

menstruation or disappearance of it altogether and that if a women becomes pregnant, the child will be still born.[87]

A study carried out by Burgess and Dean (1962) shows that the levels of living depend ultimately on levels of income. In the lower income groups, whose expenditure on food may exceed 50 percent of the total income, any rise in economic status usually reflected in an increase in the quantity of food consumed with little change in quality. At higher economic levels, however increased income usually results in greater expenditure on foods such as meat, eggs and milk products with a consequent improvement in the nutritive value of family diets. At yet higher levels, expenditure on foods may increase further, but this may not result in an improvement in the diet from the nutritional stand point. Well to do families tend to prefer expensive cuts of meat, packaged foods, fruits out of season and other luxuries, such as butter fat, candies, cakes and ice-cream which may prove detrimental to health.[93]

Brown et al (1963) found that house-wives have some nutritional beliefs in U.S.A, but these beliefs do not necessarily influence their food purchases.[94]

Bageli et al; (1964) studied the dietary habits in a rural area near Calcutta and in the city of Calcutta. He found that rural families spend 92% of the total income on food whereas the urban families spend around 58%. This difference was found to be due to a difference in expenditure pattern. In the rural areas, expenses for items other than food are negligible as compared to the amount spent for food, whereas in the urban areas expenses like rent for living rooms, clothing, education for children, amusement etc. pile up to about 35% of the total expenditure. The investigators observed food attitudes and food habits especially related to children feeding and pregnancy and found that in rural areas women were more-tied down by rigid customs regarding dietary habits, whereas those in the urban areas, were comparatively flexible. Another distinct difference was the strong tendency among the poor urban families to consume foods of

prestige value such as sugar, biscuits, lozenges, bread, tea etc; while their rural counterparts consumed puffed rice, jaggery, chapatti and seasonal fruits. In the urban families rigid dietary restrictions do not exist possibly due to the reason that the mothers have less time. Secondly they are influenced by cultural practices from various other communities and other economic groups.(95)

The food distribution in the family depends upon the status and role and interpersonal relationship among the members of the family rather than on their nutritional needs Rao (1966) reported that in Telangana region of Andhra Pradesh the Senior and earning wage earners are served first and are also given the best diet both in quantity and quality while the vulnerable segments namely the children and women of child baring age get the left overs, with the exception of milk, biscuits and other such items which are usually given to children.(96)

Jenner (1968) reported that in certain parts of West Africa, the man of the family eats first, than come the sons, then the daughters and then the wife or wives. The man takes care to leave a little on his plate for the sons, to this the mothers may add a little but often she does not. The mother serves for herself in another dish what she and the daughter well eat, but the mother gives each daughter a piece of meat corresponding to about half of what she eats herself or to a fourth or fifth of what the father eats.(97)

Monica Byrne et al; 1962 and Parvthi Rao (1968) indicated that in joint families, in the matter of child feeding and the diets of pregnant and lactating women, the mothers, mother-in-law and grand-mothers often have authority and this tells upon the nutrition of the vulnerable groups of population. A young mother, particularly one who needs help in the house with her children, does not like to antagonize the older women for fear of disapproval which thus forms into habits directed by the older women.(90)

Wilson and Lamb (1968) studied food beliefs of American women in order to demonstrate that the food choice would not be

affected by economic stress but more by education. They found that participants whose education includes home economics and nutrition did not accept the food fallacies accepted by their peers in other disciplines. Their correct beliefs about food could be attributed to education in home economics and nutrition.[98]

Devadas (1968) reported that in some South Indian villages, no special food is given to pregnant women, but the quantity of rice and milk are restricted for fear of the foetus becoming 'big' and making the delivery difficult. Similarly new lactating mother should not eat any new food as it will affect the health of child when she is feeding. But she is given extra milk, ghee, garlic, rasam, jaggery water and ash gourd for increasing her milk. Brinjal, drumstick leaves and roasted Bengal gram are avoided as they would "dry up" the milk in the breast.[99]

Arota et al; (1973) reported that different religious groups had different attitudes, taboos and beliefs with respect to certain foods. Rice, Curds, banana and orange were considered to induce cold by over 90% of the Hindus and Jain mothers. Two-thirds of Muslims, Christians and Sikh mothers reported that meat and egg were supposed to be 'hot' foods among non-vegetarians and onions among Jain's. Over one and half of the Muslim mothers and a lesser proportion of Mothers in other religions believed that consumption of sugar resulted in worm infestation. 'Massor dal' (lentil) was considered a cause of joint pains and indigestion by Jain mothers, who avoided its cooking in view of its resemblance to the colour of flesh.[100]

Storrer (1977) conducted a survey in Baroda, India and commented that "why people eat and what they eat depend upon what local foods are available, on ability to import food and on personal economy, but this is not all." She observed that peoples beliefs about food have an important influence on food behavior which constitutes food selection / preparation, serving and consumption. These beliefs may be religious, traditional, medicinal or pseudo scientific in origin.

Storrer said that there are several different food belief systems

operating throughout the world and one which is widely distributed in varying forms is that of 'hot' and 'cold' foods. This classification has been observed in South America, Central America, Malaya, China and India. These beliefs in many parts of the world are of ancient origin.

In India, by tradition, it is the women who have acquired the skills and assimilated the beliefs governing food and its preparation. Hence, the information on 'hot' and 'cold' concept and its application was obtained from women.

The data revealed that the 'hot' foods were said to produce giddiness, thirst, fatigue, sweating, inflammatory reactions and accelerated effect on digestion. The 'cold' foods were said to cause cheerfulness and pleasure of mind, to sustain life and to impart strength and steadiness to the body. Cereals, pulses, green leafy vegetables, other vegetables, milk and milk products and fruits were said to be 'cold' foods while flesh foods and spices were labeled as 'hot' foods. Oils and roots and tubers were distributed in both the categories. Regarding the application of beliefs, 'hot' foods were avoided during pregnancy and 'cold' foods during lactation. During infancy and childhood certain of both 'hot' and 'cold' were avoided. During fever time 'hot' foods were avoided and 'cold' foods during cough and cold.

The author concluded that to the Indian communities, food beliefs are not idle superstition but concepts which are important and meaningful to them especially during physiological stress.[101]

Wong Ho et al, (1997) collected data on the food consumption pattern of ethnic Chinese women in Hong Kong during pregnancy, in order to identify any risk of nutritional imbalance in this population, one hundred and sixty-seven primagravid ethnic Chinese women attending the antenatal booking clinic at the Prince of Wales Hospital in the new territories region were recruited. Among the study sample, subjects with less than 7 years of residence in Hong Kong were identified as recent immigrants (n = 25), while the remainder (n =

142) were classified as local. Half of the recent immigrants originated on the Chinese mainland and half from Indonesian. The eating patterns of the entire sample were compared with intake recommended in the Taiwan Food Guide. Comparisons were made between local and immigrant regarding age, educational standard and consumption of food from each food group. The median intake of meat and meat substitutes was significantly higher than recommendation. There was no significant difference between actual and recommended intake of fruit but the consumption of dairy products, bread and cereals and vegetables were all significantly below minimum recommendation.(102)

Nutritional beliefs and practices in 100 pregnant and 100 lactating women were assessed in an urban and rural area of Lahore by Mahmood S et al (1997). A structured questionnaire was used for the purpose. Seventy seven percent women and 54% of their husbands were illiterate, 50.5% belonged to a family with a per-capita income of more than Rs. 300.00 pre month, 52.5% had 7 or more family members and 56% were living in nuclear families. The age of mothers, type of family, literacy, family income, parity and gravidity had not significantly influenced the nutritional beliefs and practices, only urban and rural differences were statistically significant. 84% of mothers had knowledge that diet should be changed by increasing, adding or avoiding some special food items in the diet during pregnancy and lactation, but only 65.5% practiced them. The reason for this deficient knowledge and practice of dietary intake are lack of nutritional knowledge and poor economy. However, this can be overcome by improving nutritional knowledge of population in general and vulnerable group in particular through media and MCH services on the use of locally available low cost nutritious foods and to avoid undue food restrictions. Improvement of applied nutrition knowledge of medical professional is also necessary.(103)

Zobairi S E et al (1998) took up a study to determine knowledge, attitude and practice of diet and nutrition during pregnancy among women in Karachi, Pakistan. Quantitative and qualitative data were

obtained from a randomized convenience sample of 150 pregnant women from out patient clinics of 3 hospitals, Aga Khan University Hospital (AKUH), Karachi Adventist Hospital and Civil Hospital. Daily calorie intake was based on a single day. Two dietary patterns were observed. Meals among individuals with monthly income under Rs. 5000/= consisted of flatbread, lentils and / or vegetables. Meat was eaten under twice / week. Calories came primarily from flat bread, cereals and cooking oil. Those with income over Rs. 10,000/= per month ate a great variety of foods and meat frequently. The source of calories was diverse and more balanced. The women preferred milk and fresh fruits during pregnancy. Milk was desired for fetal bone development, enhanced lactation, good skin, and a settled stomach. Desired foods were described as cold and justified since the womb was a source of heat production. Lower socio-economic status (SES) groups did not trust their judgment about beneficial foods and could not afford the food they desired. Many women had food avoidances, such as hot food. The percentage of women with food avoidances increased with increased SES. Most women valued increased food consumption during pregnancy, but 68% did not increase their caloric intake and 40% decreased caloric intake. The mean caloric intakes from low to high SES, were 1087, 1656 and 1750 Kcal / day / woman, respectively.[104]

Barbara H. J. Gordon (2000) studied 193 Korean American consisted of 97 men and 96 women 19 of whom were aged 55 years or older. The majority had lived in the United States longer than 5 years.

More than 60% of food shoppers were women. The majority shopped at American food markets as much as they did at Korean Stores. Younger subjects used taste, whereas older respondents used nutritional value to guide their food choices ($p < .05$)

In bread, cereal, rice and pasta group, more subjects continued to consume rice daily compared to bread. Nearly all consumed rice at least once each day. Whereas the most subjects over age 55 years did

so more often; Japanese sticky rice was preferred to the long grain variety. Traditional roasted barley or beverages from water of boiled corn were consumed after meals.

Among vegetable and fruit groups vegetables were consumed more frequently than were meat products. Nearly 80% consumed Kimchi daily. Overall there was no change with the length of residence here. Women consumed fruits and vegetables significantly more often than did men. Seventy percent of women consumed salad at least several times a week, while only 53% of men had similar eating habits ($p > .03$). A variety of blanched vegetables were eaten at least once a day. Frequency of orange and apple consumption among women (84% and 81%) was also higher than it was for men (61% and 63%) $p > .001$ and $p > .01$ respectively.

Milk, Yogurt and dairy groups nearly 40% of the respondents consumed milk daily. In all age groups, milk consumption several times each week was high. Yogurt and meat, poultry, fish, and tofu group pork was consumed less often then were beef and chicken. Ham, sausage and bacon were rarely eaten; the majority of subjects who did consume these items were younger than 35 years of age. Few consumed oxtail or bone marrow soup once per week, but nearly 50% did so once per month. Fish remained a frequent component of diet as did beef. Tofu products were consumed once weekly to daily by 93% of subjects regardless of their length of residence.

Fats and oils sesame and corn oil were used daily by most subjects. Only a few subjects used butter, margarine or mayonnaise.[105]

Frequency of eating or meal patterns during pregnancy may be a component of maternal nutrition relevant to pregnancy outcome. To identify meal patterns of pregnant women and investigate the relation between these meal patterns and preterm delivery Siega-Riz AM et al (2001) performed an analysis using data from the pregnancy, Infection and Nutrition Study (n = 2065). Women recruited from August 1995 to December 1998 were categorized by meal patterns on the basis of their reported number of meals (breakfast, lunch and

dinner) and snacks consumed per day during the second trimester. An optimal pattern was defined according to the Institute of Medicine recommendation of three meals and two or more snacks per day. In this population 72% of the women met this recommendation and 235 delivered preterm. Women who consumed meals / snacks less frequently were slightly heavier prior to pregnancy were older and had a lower total energy intake. In addition, these women had a higher risk of delivering preterm. There was no meaningful difference in the risk by early versus late preterm delivery but those who delivered after premature rupture of the membranes had a higher risk than those who delivered after preterm labour. This study supports previous animal model work of an association between decreased frequency of eating and preterm delivery.[106]

Sharma et al, (2003) In a study to see dietary effect of dietary habits on prevalence of anaemia in pregnant women of Delhi found that there is a very high prevalence of anaemia during pregnancy in Delhi, probably due to very low frequency of meat eating in India. Different types of dietary habits had no effect on the prevalence of anaemia in pregnant women. The mean age of women was 26.5 years. Most women were in the second (26%) or third trimester (63.2%) of pregnancy. Prevalence of anaemia was found to be very high. Of 1150 women 96% were anaemic (89.8% mildly anaemic, 3% severely anaemic). Anaemia was seen in 96.18% cases in vegetarian women, 95.3% in halal meat eaters and 96.2% in jhatka meat eaters (not significant). Although the percentage of women with < 11 g/dl Hb was less in the jhatka group eating meat more than 5 times per month, than in halal meat eater and vegetarians, the difference was not statistically significant.[107]

1.2. Studies on Knowledge of Nutrition:

Young et al; (1956) reported on what the home makers know about nutrition. He found that actual performance of the home maker in feeding her family was found to be considerably better than her

which knowledge was weakest were also most poorly used. The adequacy of food used was related to nutritional knowledge.[108]

Mothers nutritional knowledge was studied by Devadas et al, (1967) while conducting an investigation on 99 pre-schoolers who came from 82 rural families. A diet survey was conducted to elicit the information on feeding pre-school children. Mothers were tested for their nutrition knowledge in relation to their education, caste, occupation and the nutritional status of their children. Results revealed that the socio-economic factors tests did not have much influence on the mother's knowledge related to feeding practices of children.[109]

Sims, (1976) reported that direct relationship exists between nutritional knowledge and occupation; High occupational groups had better knowledge of nutrition than the lower occupational groups.

He further reported that family size was negatively related to nutritional knowledge. Families with small size had better nutritional knowledge than families with large size. This difference was found to be significant in this study at 0.01 level. There was a positive and higher correlation between nutritional knowledge of mothers and their family income. Higher income groups had more knowledge than the lower income groups. This result was found significant at 0.01 level.[110]

Smith et al; (1986) conducted a study to determine the effectiveness of the supplemental food program for women, infants and children (WIC) for mothers and their anaemic children under five years of age. The intervention of the experimental group included individual counselling, group nutrition classes and provision of WIC food vouchers for purchasing foods containing essential nutrients that were deficient in the diets of high risk population. The parents, Guardians were also counselled on meal planning, shopping for food and food storage and preparations. Each child's diet was assessed after 6 months. The 30 minute education classes consisted of audio-visual presentations followed by discussions. Subjects like the importance of breast feeding, of infant nutrition, of childhood nutrition

and of consuming adequate amounts of Vitamin A and C, Iron and protein and Calcium were presented. The result of 24 hour dietary assessment in the experimental group at the end of the study showed that the intake of 8% of the participants were still below the RDA for vitamin A, while 4% were below RDA for Iron and Folacin. The difference in the mean pre and post test results of participants in the educational presentation indicated an increase in their knowledge on each subject, with difference in the pre and post tests for the vitamins A and C presence. Intervention process affected the out-come in the statistically significant way.[111]

A pilot dietary survey using telephone was conducted by Susanna et al (1995) to evaluate the current dietary intake, food habits and nutrition knowledge of 198 random sample of adults aged between 18 – 60, and to arouse the awareness of the government health related professionals and the public on diet and related diseases. The study revealed that there was a high intake of meat group (=327 g/d), low intake of rice and cereals (3.8 bowls / d), inadequate consumption of vegetables (3.6 serving / d) and fruits (1.7 servings /d) – when compared to the established healthy food guides. Milk intake was only 0.6 cup / d. Processed food high in animal fat, protein and sodium were popular among the adults. 96% household used pure vegetable oils for cooking, 69% never ate unlicensed street foods, 55% never drank alcohol. 14% were estimated to be obese (BMI: 25 – 40) only 43% regularly preformed physical exercise more than 45 minutes a week. Considering the repeatedly reported high mean total serum cholesterol of Hong Kong adults (5.0 – 5.5 m mol /*l*), imprudent dietary practices and increasing episodes of myocardial infarction in the younger Hong Kong adults, increases in morbidity and mortality from cardio and cerebo-vascular diseases in Hong Kong is foreseeable in the future. Thus, before it becomes too late and too costly to combat the disease it is necessary to identify the risk factors of degenerative diseases to promote healthy life styles, and to establish the healthy eating guidelines and community nutrition education for the population.[112]

Wu B et at; (1998) studied the improvement of the intakes of various nutrients including protein, fat, carbohydrates fibers, calcium, iron, Zinc et al, in pregnant women after appropriate diet consultation by doctors. In total 100 cases of pregnant women coming to for diet consultation clinic were randomly selected, in which 50 cases (control group) came for the first time and another 50 cases (study group) were for the third visit at least. The diet nutrition of the study group after the second consultation was compared with that before consultation and with concurrent control group. The results of the study showed that after diet consultation, except for retinol, the intake of various nutrients, including calorie intake, protein, fibers, magnesium calcium, phosphorous, iron zinc, vitamin E, riboflavin, thiamine, nicotinic acid in the study group were significantly improved compared with that of the study group before diet consultation and of the control group ($p < 0.01$). Hence they concluded diet consultation plays excellent role in promoting scientific and appropriate nutrient intake of pregnant women.[113]

Ortega RM (2001), considering the criteria suggested by a number of researchers concerning the number of food portion from each food group that pregnant women should include in their diets, the following guidelines for daily consumption are proposed: 3 – 4 portions of milk products, 2 – 3 portions of meat, fish or eggs and 3 portions of fruit, 4 – 5 portions of vegetables or greens and 7 – 8 portions, of cereals and legumes (a portion is defined as the amount of food that would be found on an average plateful or the normal unit of consumption of a food).[114]

Kozlowsk – Wojciechowska M, (2002); conducted a study with the use of 3 specially prepared questionnaires, among 77 women in the III trimester of pregnancy, participating in the parturition school course. The first questionnaire referred to general data (age, education, and anthropometric data) and the way of supplementing diet with medicinal compounds supplying vitamins and minerals. The second questionnaire showed the dietary habits before pregnancy, while the

third questioned the influence of diet on the course of pregnancy and health of the infant. In the second stage the eating habits of the subjects were studied also with the use of 24 hour interview and an album of food products issued by the institute of Food and Nutrition. The analysis of the results of the study showed that though pregnancy is a difficult period for a woman, it did not make the subjects pay particular attention to their diet. The study showed also that the majority of women does have knowledge on the influence of diet and the influence of her nourishment before pregnancy on the development of foetus; however, it hardly results in the change of their eating habits.(115)

Fowles E R; (2002) described the differences between low and middle income pregnant women's general nutritional knowledge, usual dietary intake and weight gain. Total 109 women were selected for the study. He found that women with a low Pre-pregnant body mass index (BMI) gained less weight, and women with high BMI tended to gain more weight than recommended. Most women had inadequate general nutritional knowledge and their dietary intake did not meet all the nutritional requirement of pregnancy. Women attending the free prenatal clinic had more accurate knowledge of recommended number of servings for some good groups (fruits and vegetables, meats and dairy) than women in childbirth education classes. No differences were noted between the groups in total weight gain.(116)

Chapter III

(Material and Methods)

MATERIALS AND METHODS

The present study has been carried over a period of two and a half years with the aim to obtain information about *"Nutritional Status and Dietary Habits of Kashmiri Women"*.

1. Material Selection:

a) Selection of Area: Out of six districts of Kashmir Division, two districts were selected viz. district Srinagar and district Budgam. From each district a systematic proportionate random sampling technique has been used to select the area. District Srinagar included only urban area where as district Budgam mainly rural area. The urban area of Srinagar city was arbitrarily divided in four zones (North, South, East and West). From each zone six wards were randomly selected and thereafter ward to be surveyed from zone were identified from the list provided by municipality (Srinagar). Similarly, from district Budgam blocks were randomly selected (Khansahib, Beerwah, Baghat-Kanipora, Khag, Narbal and Nagam) for the survey representing various geographic areas (six were included to obtain proportionately same sample size as for urban area).

b) Sample Size: The total number of women selected for this study were 1600 with equal proportion of 800 from rural and 800 from urban area. From each group same number of women belonging to different physiological status like Pre-pregnant (married but without children), pregnant (mostly women in Ist trimester of pregnancy), lactating and Non-pregnant non-lactating women were included in equal proportion.

2. Method used:

Women were approached in their natural settings and various methods for collecting different information was as under:-

❖ For assessment of nutritional status:

i. For clinical assessment: A standard pre-designed schedule used as criteria for clinical assessment as per WHO expert

committee within classified signs used in nutrition surveys appeared in WHO technical report series 258 was used.

ii. Anthropometric assessment: Anthropometric measurement of height and weight (thereby calculating body mass index) was used.

❖ For dietary intake / habits:

For this 24 hour dietary recall was collected for dietary intake and information on dietary likes and dislikes, food taboos and food consumption pattern was collected as per proforma to know about food habits.

❖ Nutritional knowledge:

Nutritional knowledge was obtained by collecting information about sources, functions, nutrient requirements and cooking practices.

3. Tool used:

For Anthropometry:-

➢ A weighing machine (Krups) for assessment of weight of women.

➢ For assessment of height fixed tape on wall was used.

➢ For assessment of BMI calculations of wt/Htm^2 was used.

➢ Nutritional assessment schedule (clinical examination) was used to find out deficiency symptoms

For dietary intake / habits:-

➢ For dietary intake 24 hours recall method was used.

➢ For dietary habits pre-tested and pre-designed questionnaire was used.

For nutritional knowledge:-

➢ A scoring technique was used.

4. Collection of Data:

Data collection was done by the questionnaire cum interview method on women and various questions in the schedule were

discussed in detail before-hand. Assessment of nutritional status was performed by the investigator with the help of a general practitioner and then applied on a trial basis on some women in the presence of same. The exercise was repeated several times to become familiar with anthropometry as well as clinical assessment. A pre-designed and pre-tested schedule was tested on 10% of the sample for finding its acceptability and completeness before administering it on the entire sample population. The requisite modification to the questionnaire was incorporated on the proforma that was finally used.

Structure of questionnaire:

The five different parts of questionnaire were:-

A. General information:

This section was pertaining to the family background of the respondents and included residential address, age, religion, literacy, occupation, income, type of family, family size and number of children etc.

B. Anthropometric Measurements:

Height:- Height was measured with the help of a non-stretch tape that was fixed to a flat wall. The women were asked to remain barefoot and the hair flat. Both feet were lying together with heals, buttocks, shoulders touching the wall. The women were asked to stand erect, looking straight ahead. The top of the ear and outer corner of the eye were in line parallel to the floor (Frankfort plane). The hands were hanging by the sides in a natural manner.

A horizontal bar was allowed to rest flat on the top of the head and the height was recorded to the nearest 0.5 cm.

Weight:- Weight was recorded with the help of weighing machine (Spring type). Woman was asked to stand on the balance without shoes and minimal clothing. Before recording the weight of a woman everyday, using the known weight (standard weight) balance was standardized and the scale was adjusted accordingly if required. Weight was recorded to the nearest 100 grams.

BMI:- BMI was calculated directly from the observed measurements of weight and height. The formula used for calculation was:

$$BMI = \frac{\text{Weight (Kg)}}{\text{Height}^2\text{ (m)}}$$

C. Clinical Examination:

This section included information on general appearance, hair, eyes, lips, tongue, teeth, gums, skin and nails of the women which helped in assessing out any signs of nutritional deficiencies.

D. Dietary Habits:

A quantitative and qualitative diet survey was carried out on the sample to collect information regarding the nutrient intake. This was done by:-

- ❖ 24 hour recall (Quantitative assessment) The quantity of food consumed by the sample in terms of household measurements was recorded and latter converted into metric weights and the nutritive value was calculated with the help of food composition table.
- ❖ Qualitative diet survey included respondents information about the number of meals consumed per day, nature of diet, food likes and dislikes, food beliefs and taboos, medium of cooking food, inclusion of special foods in daily diet during pregnancy / lactating.
- ❖ Frequency of consumption of different food stuffs was also found.

E. Nutritional Knowledge:

Respondents knowledge regarding sources and functions of nutrients, nutritional requirements and methods of cooking were assessed by scoring the information gathered from the respondents by ordinal scale. For this purpose a special scoring technique was devised which was approved by a sociologist. The scoring technique is as under:-

Scoring technique for assessing knowledge regarding sources and functions of Nutrients- E_1:

This section included information gathered from respondents regarding sources and functions of nutrients. The total number of questions which could be scored in this section was eleven. The maximum score for this section was 29 and according to scores obtained women were categorized in three groups i.e. with score = or > 20 as Good, 14 – 19 Fair, and < 14 Poor. Details of score are given in annexure I.

Scoring system adapted for assessing knowledge regarding nutritional requirements– E2:

Section E_2 included information gathered from respondents regarding nutritional requirements. Total number of questions which could be scored were seven and the maximum score in this section that could be obtained by a woman was 13. Women were categorized again in 3 groups with score of ≥ 9 as Good, 6 – 8 as Fair and score below 6 as Poor. The details of scoring are shown in annexure II.

Scoring system regarding assessment of knowledge of cooking practices and nutrient loss- E_3:

Total number of questions in this section which could be scored was eight and the maximum score a woman could get was 18. Categorization was again made as Good with 13 or more, Fair as 12-9 and Poor as less that 9 score. The details are given in annexure III.

Women were also categorized as per total score obtained for their knowledge on nutrition. Overall score for nutritional knowledge for section $E_1 + E_2 + E_3$ was 60 points. Women scoring 43 and above points were categorized as possessing overall Good nutritional knowledge those scoring between 42 – 30 as Fair and those with below 30 points were termed as possessing Poor nutritional knowledge.

5. Data Analysis:

The analysis was divided into three main parts. First part dealing with general characteristics, second with nutritional assessment and third with nutritional knowledge. Data was analyzed by descriptive procedures for evaluating contingency tables (for various comparisons), averages and dispersion. Besides this inter and intra group comparison between / among the groups was made by using chi-square test, students t-test was also used to analyze the data.

Limitations:

The researcher had to face a number of difficulties while collecting data. Prevailing conditions in the valley proved to be at times a hindrance in collecting data, secondly women were not much cooperative and were occasionally reluctant to allow the investigator to take anthropometric measurements and record 24 hour recall. Some women were also reluctant to disclose their food habits, taboos, likes and dislikes. It needed lots of persuasion and motivation on the part of the investigator to overcome these hindrances. District Budgam is near to Srinagar city and some of the areas cannot be truly considered rural areas. Also religious ethnicity between the two districts may be a limiting factor.

Chapter IV
(Results and Discussion)

RESULTS

The analysis of data is based on 1600 women with 800 rural and 800 urban women that were further divided into four groups based on their physiological status i.e 25% of Pre-pregnant, pregnant, lactating and Non-pregnant non-lactating women in each group. Sample was equally distributed among rural and urban population.

A: TABLE OF GENERAL SECTION

TABLE- 1: DISTRIBUTION OF SAMPLE UNDER STUDY

Physiological Status	Dwelling: Rural No.	Rural % age	Urban No.	Urban % age	Total No.	Total % age
Pre-pregnant	*200*	*12.5*	*200*	*12.5*	*400*	*25.0*
Pregnant	*200*	*12.5*	*200*	*12.5*	*400*	*25.0*
Lactating	*200*	*12.5*	*200*	*12.5*	*400*	*25.0*
Non-pregnant non-lactating	*200*	*12.5*	*200*	*12.5*	*400*	*25.0*

Table 2 depicts the mean age of women was 27.89 ± 6.33 years, however, there was a significant difference in the age of women belonging to different physiological status. The mean age of Pre-pregnant women was 23.65 ± 4.49 years. It was 25.09 ± 4.55 years for pregnant, 28.31 ± 4.97 years for lactating and 34.50 ± 5.01 years for Non-pregnant non-lactating women. Minimum age of a Pre-pregnant women was 16 years, for pregnant women it was 17 years, that of a lactating mother was 19 years. The age difference was statistically significant.

TABLE- 2: COMPARISON OF AVERAGE AGE (YEARS) OF THE SAMPLE

Physiological Status	Number	Range (Age in Years)	Mean ± S.D.
Pre-pregnant	*400*	*16-35*	*23.6 ± 4.49*
Pregnant	*400*	*17-39*	*25.09 ± 4.55*
Lactating	*400*	*19-40*	*28.31 ± 4.97*
Non-pregnant non-lactating	*400*	*18-45*	*34.50 ± 5.01*
Overall	**1600**	**16-45**	**27.89 ± 6.33**

p = .000 (Sig.), f = 409.737

TABLE- 3: DISTRIBUTION OF SAMPLE AS PER RELIGION

Group	Religion						Total	
	Muslim		Sikh		Hindu			
	No.	% age	No.	% age	No.	% age	No.	% age
Pre-pregnant	395	98.7	5	1.3	–	–	400	100.0
Pregnant	394	98.5	–	–	6	1.5	400	100.0
Lactating	398	99.5	–	–	2	0.5	400	100.0
Non-pregnant non-lactating	397	99.2	–	–	3	0.8	400	100.0
Overall	**1584**	**99.0**	**5**	**0.3**	**11**	**0.7**	**1600**	**100.0**

Table 3 shows that majority of women (99.0%) were Muslims in this study with 0.7% as Hindu and 0.3% as Sikhs.

TABLE- 4: DISTRIBUTION OF SAMPLE AS PER LITERACY STATUS

Group	Illiterate		Primary		Matriculate		Graduates		Post Graduates / Professionals		Total	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	141	35.2	67	16.8	57	14.3	93	23.2	42	10.5	400	100.0
Pregnant	194	48.5	39	9.8	32	8.0	95	23.7	40	10.0	400	100.0
Lactating	192	48.0	38	9.5	50	12.5	75	18.7	45	11.3	400	100.0
Non-pregnant non-lactating	178	44.5	41	10.3	33	8.3	89	22.2	59	14.7	400	100.0
Overall	**705**	**44.1**	**185**	**11.5**	**172**	**10.8**	**352**	**22.0**	**186**	**11.6**	**1600**	**100.0**

The above table reveals that 55.9% of women were literate and 44.1% were illiterate. Only 11.5% women were literate upto primary level and rest (44.4%) were matriculates and above. The results further depict that percentage of illiteracy was lowest (35.2%) in Pre-pregnant women and highest among lactating and pregnant mother (about 48%).

TABLE- 5: WORKING STATUS OF SAMPLE UNDER STUDY

Group	Working Status										Total	
	Professional		Skilled		Semi-Skilled		Un-skilled		Housewives			
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	10	2.5	48	12	37	9.2	139	34.8	166	41.5	400	100.0
Pregnant	14	3.5	50	12.5	21	5.2	145	36.3	170	42.5	400	100.0
Lactating	16	4.0	43	10.8	8	2.0	158	39.5	175	43.7	400	100.0
Non-pregnant non-lactating	17	4.2	57	14.2	34	8.5	107	26.8	186	46.3	400	100.0
Overall	**57**	**3.6**	**198**	**12.4**	**100**	**6.2**	**549**	**34.3**	**696**	**43.5**	**1600**	**100.0**

Source: Working Class "Social and preventive Medicine" by J. E. Park (1976)

Professional: *Doctors, Engineers, Architects, Nurses and Dieticians.*
Skilled: *Teachers, Computer operators and Technical Assistants.*
Semi-Skilled: *Handicrafts and Business.*

Un-Skilled: *Agri-Labourers, Peons, and Maids.*

Housewives

The working status of studied sample shows 43.5% women were housewives and 52.9% were either unskilled, skilled or semiskilled. The lowest number of housewives (41.5%) belonged to Pre-pregnant category and majority of housewives (46.3%) belonged to Non-pregnant non-lactating group. The number of women who were housewives was almost same in pregnant (42.5%) and lactating group (43.7%).

TABLE- 6:

DISTRIBUTION OF SAMPLE AS PER AVERAGE INCOME OF FAMILY

Physiological Status	Per-capita Income/Month (Rs.)		Income / Month / Family (Rs.)	
	Range	Mean ± S.D.	Range	Mean ± S.D.
Pre-pregnant	*440 – 6,667*	*2,301 ± 1,651*	*2,000 – 50,000*	*12,495 ± 8,380*
Pregnant	*464 – 6,250*	*2,327 ± 1,548*	*1,500 – 50,000*	*14,885 ± 10,264*
Lactating	*453 – 6,670*	*1,887 ± 1,416*	*2,000 – 50,000*	*11,913 ± 7,954*
Non-pregnant, non-lactating	*438 – 6,750*	*2,369 ± 1,669*	*2,000 – 50,000*	*13,712 ± 10,062*
Overall	**438 – 6,750**	**2,210 ± 1,579**	**1,500 – 50,000**	**13,231 ± 9,273**

p = .001 (Sig.)

The overall average per-capita income per month of sample was Rs. 2,210 ± 1,579. The per-capita income per month ranged from as low as Rs. 438 to as high as Rs. 6,750. Similarly family income per month ranged from minimum of Rs. 1,500 to maximum Rs. 50,000 with mean monthly income as Rs. 13,231± 9,273. The variations in income were statistically significant ($p<.001$).

TABLE- 7:

DISTRIBUTION OF SAMPLE AS PER SOCIO-ECONOMIC STATUS

Group	Socio – Economic Status: Low		Lower -Middle		Upper- Middle		High		Total	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	*49*	*12.2*	*95*	*23.8*	*64*	*16.0*	*192*	*48.0*	*400*	*100.0*
Pregnant	*55*	*13.8*	*103*	*25.7*	*50*	*12.5*	*192*	*48.0*	*400*	*100.0*
Lactating	*68*	*17.0*	*54*	*13.5*	*68*	*17.0*	*210*	*52.5*	*400*	*100.0*
Non-pregnant non-lactating	*48*	*12.0*	*71*	*17.7*	*80*	*20.0*	*201*	*50.3*	*400*	*100.0*
Overall	**220**	**13.7**	**232**	**20.2**	**262**	**16.4**	**795**	**49.7**	**1600**	**100.0**

Source: Income Group "Social and Preventive Medicine" by K. Park (1997)

Pearson Chi – Square (x^2) = 31.431, p = .000 (Sig.)

Income groups / annum

Low	*upto 20,000*
Lower-middle	*20,001 – 40,000*
Upper-middle	*41,000 – 62,000*
High	*62,001 – 86,000*
Above	*86,000*

Socio–economic status as per family income (per annum) depicted that almost half of the studied women viz, 49.7% belonged to high socio–economic class with annual income of 86,000 or more. Another 36.6% belonged either to lower-middle or upper-middle group and only 13.7% belonged to low socio–economic group.

Group	Type of Family: Joint No.	Joint % age	Nuclear No.	Nuclear % age	Total No.	Total % age
Pre-pregnant	*363*	*90.8*	*37*	*9.2*	*400*	*100.0*
Pregnant	*333*	*83.2*	*67*	*16.8*	*400*	*100.0*
Lactating	*288*	*72.0*	*112*	*28.0*	*400*	*100.0*
Non-pregnant non-lactating	*197*	*49.2*	*20.*	*50.8*	*400*	*100.0*
Overall	**1181**	**73.8**	**419**	**26.2**	**1600**	**100.0**

TABLE- 8:
DISTRIBUTION OF SAMPLE ACCORDING TO TYPE OF FAMILY

Group	Type of Family: Joint No.	Joint % age	Nuclear No.	Nuclear % age	Total No.	Total % age
Pre-pregnant	*363*	*90.8*	*37*	*9.2*	*400*	*100.0*
Pregnant	*333*	*83.2*	*67*	*16.8*	*400*	*100.0*
Lactating	*288*	*72.0*	*112*	*28.0*	*400*	*100.0*
Non-pregnant non-lactating	*197*	*49.2*	*20.*	*50.8*	*400*	*100.0*
Overall	**1181**	**73.8**	**419**	**26.2**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 203.324, p = .000 (Sig.)

73.8% women belonged to joint families and 26.2% to nuclear families. Further more 90.8% Pre-pregnant women belonged to joint

families whereas 49.2% Non-pregnant non-lactating women lived in joint families. Almost half of (50.8%) Non-pregnant non-lactating women were residing in nuclear families and only 9.2% Pre-pregnant women were living in nuclear families.

TABLE- 9:

COMPARISON OF AVERAGE FAMILY SIZE OF SAMPLE

Physiological Status	Number	Number of Family Members		
		Min	Max	Median
Pre-pregnant	*400*	*2*	*45*	*7.00*
Pregnant	*400*	*2*	*30*	*7.00*
Lactating	*400*	*3*	*27*	*7.50*
Non-pregnant non-lactating	*400*	*3*	*25*	*6.00*
Overall	**1600**	**2**	**45**	**7.00**

Average family size ranged from 2 to 45 with median number of 7 members per family.

TABLE- 10:

AVERAGE NUMBER OF CHILDREN OF SAMPLE

Group	Number of Women	Number of Children		
		Min	Max	Median
Pregnant	*196*	*1*	*4*	*1.00*
Lactating	*400*	*1*	*8*	*2.00*
Non-pregnant non-lactating	*400*	*1*	*8*	*3.00*
Overall	**996**	**1**	**8**	**2.00**

N.B.: *Pre-pregnant women are excluded as this group comprises of women who were married but without children.*

This Table also excludes two hundred four pregnant women because it was their first pregnancy.

The median number of children in pregnant, lactating and Non-pregnant non-lactating or multi-gravidae mothers was one, two and three respectively. However average number of children ranged from 1 to 8 per family.

TABLE- 11:

TABLE SHOWING COMPAISON OF NUMBER OF CHILDREN OF SAMPLE

Group	Grouped Number of Children							
	1-2		3-4		More Than 4		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
Pregnant	*150*	*76.5*	*46*	*23.5*	–	–	*196*	*100.0*
Lactating	*243*	*60.8*	*116*	*29.0*	*41*	*10.3*	*400*	*100.0*
Non-pregnant non-lactating	*190*	*47.5*	*155*	*38.8*	*55*	*13.8*	*400*	*100.0*
Overall	**583**	**58.5**	**317**	**31.8**	**96**	**9.7**	**996**	**100.0**

N.B.: *Pre-pregnant women are excluded as this group comprises of women who were married but without children.*
This Table also excludes two hundred four pregnant women because it was their first pregnancy.

58.5% women had one to two children, where as 41.5% women had more than three children.

B: GENERAL PHYSICAL EXAMINATION

TABLE- 12:

COMPARISON OF GENERAL APPERANCE OF SAMPLE

Physiological Status	General Appearance							
	Normal Built		Thick Built		Thin Built		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	*281*	*70.2*	*64*	*16.0*	*55*	*13.8*	*400*	*100.0*
Pregnant	*280*	*70.0*	*41*	*10.2*	*79*	*19.8*	*400*	*100.0*
Lactating	*271*	*67.8*	*77*	*19.2*	*52*	*13.0*	*400*	*100.0*
Non-pregnant non-lactating	*179*	*44.8*	*170*	*42.2*	*51*	*12.8*	*400*	*100.0*
Overall	**1011**	**63.2**	**252**	**22.0**	**237**	**14.8**	**1600**	**100.0**

N.*B.:* *Women who looked healthy (apparently) were designated as normal built, women who had a well stocky built were termed thick built and who appeared lean were termed thin built.*
Pearson Chi – Square (x^2) *= 183.374, p = .000 (Sig.)*

63.2% women were of normal built, 22.0% had thick built and 14.8% were thin. These differences between the general appearance of Pre-pregnant, pregnant, lactating and Non-pregnant non-lactating women were found statistically significant.

TABLE- 13:

COMPARISON OF PHYSICAL EXAMINATION OF HAIR OF SAMPLE

Physiological Status	Hair					
	Normal		Abnormal		Total	
	No.	%age	No.	%age	No.	%age
Pre-pregnant	*366*	*91.5*	*34*	*8.5*	*400*	*100.0*
Pregnant	*347*	*86.8*	*53*	*13.2*	*400*	*100.0*
Lactating	*336*	*84.0*	*64*	*16.0*	*400*	*100.0*
Non-pregnant non-lactating	*350*	*87.5*	*50*	*12.5*	*400*	*100.0*
Overall	**1399**	**87.4**	**201**	**12.6**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 10.487, p = .015 (Insig)

Physical examination of hair revealed that 87.4% women had normal hair, and 12.6% had abnormal hair which included easy pluckability and lack of luster or dull hair. The highest percentage of women (16.0%) having hair abnormalities belonged to lactating group and lowest (8.5%) percentage was observed among Pre-pregnant group. However these differences were insignificant (p>.01).

TABLE- 14:

COMPARISON OF PHYSICAL EXAMINATION OF EYES OF SAMPLE

Physiological Status	Eyes					
	Normal		Pale Conjunctiva		Total	
	No.	%age	No.	%age	No.	%age
Pre-pregnant	*246*	*61.5*	*154*	*38.5*	*400*	*100.0*
Pregnant	*135*	*33.8*	*265*	*66.2*	*400*	*100.0*
Lactating	*183*	*45.8*	*217*	*54.2*	*400*	*100.0*
Non-pregnant non-lactating	*204*	*51.0*	*196*	*49.0*	*400*	*100.0*
Overall	**768**	**48.0**	**832**	**52.0**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 64.002, p = .000 (Sig.)

Clinical examination of eyes revealed pale conjunctiva as the main finding and in general 52.0% of women had pale conjunctiva. The percentage of this was 66.2% among pregnant women, 54.2% among lactating women and 49.0% in Non-pregnant non-lactating women. This clinical finding may be related to anaemia. The group variations were significant (p<.01).

TABLE–15:

COMPARISON OF PHYSICAL EXAMINATION OF LIPS OF SAMPLE

Physiological Status	Lips							
	Angular-Stomatitis		Chelosis		Normal		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	–	–	5	1.2	395	98.8	400	100.0
Pregnant	15	3.8	4	1.0	381	95.2	400	100.0
Lactating	35	8.8	4	1.0	361	90.2	400	100.0
Non-pregnant non-lactating	19	4.8	–	–	381	95.2	400	100.0
Overall	**69**	**4.3**	**13**	**0.8**	**1518**	**94.9**	**1600**	**100.0**

Pearson Chi – Square (x2) = 42.071, p = .000 (Sig.)

Examination of mouth and lips showed no lip abnormalities in 94.9% women. Where as 4.3% women had angular stomatitis. Which may be attributed to nutritional deficiency and 0.8% had chelosis again commonly attributed to vitamin deficiency.

TABLE- 16:

COMPARISON OF PHYSICAL EXAMINATION OF TONGUE OF SAMPLE

Physiological Status	Tongue					
	Normal		Abnormal		Total	
	No.	%age	No.	%age	No.	%age
Pre-pregnant	373	93.3	27	6.7	400	100.0
Pregnant	351	87.8	49	12.2	400	100.0
Lactating	331	82.8	69	17.2	400	100.0
Non-pregnant non-lactating	355	88.8	45	11.2	400	100.0
Overall	**1410**	**88.1**	**190**	**11.9**	**1600**	**100.0**

Pearson Chi – Square (x2) = 21.286, p = .000 (Sig.)

Clinical examination of tongue revealed that 88.1% women had normal tongue and 11.9% women had tongue abnormalities i.e., either red and raw tongue or pale and flabby tongue which may be again a feature of nutritional deficiency of vitamins.

TABLE- 17:

COMPARISON OF PHYSICAL EXAMINATION OF TEETH OF SAMPLE

Physiological Status	Teeth: Normal No.	%age	Teeth: Dental Caries No.	%age	Total No.	%age
Pre-pregnant	*363*	*90.8*	*37*	*9.2*	*400*	*100.0*
Pregnant	*382*	*95.5*	*18*	*4.5*	*400*	*100.0*
Lactating	*371*	*92.8*	*29*	*7.2*	*400*	*100.0*
Non-pregnant non-lactating	*352*	*88.0*	*48*	*12.0*	*400*	*100.0*
Overall	**1468**	**91.8**	**132**	**8.2**	**1600**	**100.0**

Pearson Chi – Square (x2) = 15.919, p = .001 (Sig.)

The above table depicts that there was very low prevalence of dental caries in women. Only 8.2% women had dental caries, whereas majority (91.8%) of women had normal teeth. The dental caries was more seen in Pre-pregnant women (9.0%) and Non-pregnant non-lactating women (12.0%) and these differences were significant.

TABLE- 18:

COMPARISON OF PHYSICAL EXAMINATION OF GUMS OF SAMPLE

Physiological Status	Gums: Normal No.	%age	Gums: Bleeding Gums No.	%age	Total No.	%age
Pre-pregnant	*369*	*92.3*	*31*	*7.7*	*400*	*100.0*
Pregnant	*365*	*91.3*	*35*	*8.7*	*400*	*100.0*
Lactating	*359*	*89.8*	*41*	*10.2*	*400*	*100.0*
Non-pregnant non-lactating	*362*	*90.5*	*38*	*9.5*	*400*	*100.0*
Overall	**1455**	**90.9**	**145**	**9.1**	**1600**	**100.0**

Pearson Chi – Square (x2) = 8.094, p = .044 (Insig)

Physical examination of Gums showed that 90.9% women had normal gums where as 9.1% women had bleeding gums.

TABLE- 19:
COMPARISON OF PHYSICAL EXAMINATION OF SKIN OF SAMPLE

Physiological Status	Skin					
	Normal		Abnormal		Total	
	No.	%age	No.	%age	No.	%age
Pre-pregnant	*378*	*94.5*	*22*	*5.5*	*400*	*100.0*
Pregnant	*356*	*89.0*	*44*	*11.0*	*400*	*100.0*
Lactating	*365*	*91.3*	*35*	*8.7*	*400*	*100.0*
Non-pregnant non-lactating	*368*	*92.0*	*32*	*8.0*	*400*	*100.0*
Overall	**1467**	**91.7**	**133**	**8.3**	**1600**	**100.0**

Pearson Chi – Square (x2) = 8.094, p = .044 (Insig)

Clinical examination of skin showed that only 8.3% women had skin abnormalities where as 91.7% women had normal skin. The skin abnormalities were seen as defused de-pigmentation of skin and dry and scaly skin. The proportion of women with abnormal skin was more among pregnant group (11.0%) as compared to 8.7% in lactating and 8.0% in Non-pregnant non-lactating women. As far as Pre-pregnant women were concerned only 5.5% of them had skin abnormalities.

TABLE- 20:
COMPARISON OF PHYSICAL EXAMINATION OF NAILS OF SAMPLE

Physiological Status	Nails					
	Normal		Abnormal		Total	
	No.	%age	No.	%age	No.	%age
Pre-pregnant	*320*	*80.0*	*80*	*20.0*	*400*	*100.0*
Pregnant	*317*	*79.3*	*83*	*20.7*	*400*	*100.0*
Lactating	*292*	*73.0*	*108*	*27.0*	*400*	*100.0*
Non-pregnant non-lactating	*306*	*76.5*	*94*	*23.5*	*400*	*100.0*
Overall	**1235**	**77.2**	**365**	**22.8**	**1600**	**100.0**

Pearson Chi – Square (x2) = 6.854 , p = .077 (Sig.)

77.2% women under study had normal nails and 22.8% women had either spoon shaped nails or white spots on nails, a common sign of anaemia among mothers. The percentage of women with this abnormality was more in lactating women.

C: NUTRIENT INTAKE

TABLE- 21:
AVERAGE CALORIE INTAKE OF WOMEN (24 HOUR RECALL)

Physiological Status	Number	Calorie Intake (Kcal) Range	Mean ± S.D.	p value	Result
Rural Pre-pregnant	200	1297 – 2478	1879.36 ± 208.45	.013	Sig
Urban Pre-pregnant	200	1317 – 2206	1833.40 ± 156.77		
Total	**400**	**1297 – 2478**	**1856.38 ± 185.63**		
Rural Pregnant	200	1062 – 2575	1722.57 ± 269.89	.000	Sig
Urban Pregnant	200	1184 – 2305	1879.91 ± 267.66		
Total	**400**	**1062 – 2575**	**1801.24 ± 279.75**		
Rural Lactating	200	1712 – 3029	2622.26 ± 274.56	.000	Sig
Urban Lactating	200	1184 – 3057	2111.71 ± 342.99		
Total	**400**	**1184 – 3057**	**2366.99 ± 401.99**		
Rural Non-pregnant non-lactating	200	1592 - 2402	1964.62 ± 159.98	.000	Sig
Urban Non-pregnant non-lactating	200	1125 – 2180	1722.75 ± 210.69		
Total	**400**	**1125 – 2402**	**1843.68 ± 222.64**		
Rural Women	**800**	**1062 – 3029**	**2047.20 ± 414.76**	.000	Sig
Urban Women	**800**	**1125 - 3057**	**1886.94 ± 290.59**		
Overall (ANOVA)	**1600**	**1062 – 3057**	**1967.07 ± 366.85**		

Table depicts that the overall mean calorie intake of women as per 24 hour recall was 1967.07 ± 366.85 Kcal.

The table further reveals that the mean calorie intake was highest among lactating women which was 2366.99 ± 401.99 Kcal, followed by Pre-pregnant women i.e. 1856.38 ± 185.63 Kcal. This was almost same as that of Non-pregnant Non-lactating women (1843.68 ± 222.64 Kcal). However lowest calorie intake of 1801.24 ± 279.75 Kcal was observed among pregnant women.

This difference in mean calorie intake of women belonging to different physiological status was statistically significant.

Also it can be observed from the above table that mean calorie intake of rural women was (2047.20 ± 414.76 Kcal) greater than mean calorie intake of urban women (1886.94 ± 290.59 Kcal).

TABLE- 22:

AVERAGE PROTEIN INTAKE OF WOMEN (24 HOUR RECALL)

Physiological Status	Number	Protein Intake (gms)		p value	Result
		Range	Mean ± S.D.		
Rural Pre-pregnant	200	28 – 59	43.85 ± 6.07		
Urban Pre-pregnant	200	31 – 69	55.13 ± 7.81	.000	Sig
Total	**400**	**28 – 69**	**49.49 ± 8.98**		
Rural Pregnant	200	27 – 61	38.76 ± 8.13		
Urban Pregnant	200	31 – 85	52.69 ± 10.70	.000	Sig
Total	**400**	**27 – 85**	**45.72 ± 11.78**		
Rural Lactating	200	33 – 96	61.99 ± 10.42		
Urban Lactating	200	39 – 95	65.84 ± 12.08	.001	Sig
Total	**400**	**33 – 96**	**63.91 ± 11.40**		
Rural Non-pregnant non-lactating	200	31 – 71	42.61 ± 6.74		
Urban Non-pregnant non-lactating	200	27 – 65	47.69 ± 9.51	.000	Sig
Total	**400**	**27 – 71**	**45.15 ± 8.62**		
Rural Women	**800**	**27 – 96**	**46.80 ± 12.02**		
Urban Women	**800**	**27 – 95**	**55.34 ± 12.09**	**.000**	**Sig**
Overall (ANOVA)	**1600**	**27 - 96**	**51.07 ± 12.79**		

Overall protein intake of women ranged from 27-96 gms with mean protein intake per day as 51.07 ± 12.79 gms.

Lactating women had highest average intake of protein (63.91 ± 11.40 gms) followed by Pre-pregnant women (49.49 ± 8.98 gms). The mean protein intake of pregnant and Non-pregnant non-lactating was lowest (almost same in both groups i.e. 45.72 ± 11.78 gms and 45.15 ± 8.62 gms respectively). It can be also observed that protein intake per day of urban women was greater (55.34 ± 12.09 gms) than protein intake of rural women (46.80 ± 12.02 gms).

The differences between the groups were significant.

TABLE- 23:
AVERAGE CALCIUM INTAKE OF WOMEN (24 HOUR RECALL)

Physiological Status	Number	Calcium Intake (mgs)		p value	Result
		Range	Mean ± S.D.		
Rural Pre-pregnant	*200*	*75 – 927*	*292.11 ± 157.52*		
Urban Pre-pregnant	*200*	*144 – 1022*	*513.31 ± 206.64*	*.000*	*Sig*
Total	***400***	***75 – 1022***	***402.71 ± 214.33***		
Rural Pregnant	*200*	*95 – 767*	*234.98 ± 116.49*		
Urban Pregnant	*200*	*199 – 1349*	*607.39 ± 249.78*	*.000*	*Sig*
Total	***400***	***95 – 1349***	***421.18 ± 269.53***		
Rural Lactating	*200*	*171 – 1684*	*401.10 ± 292.54*		
Urban Lactating	*200*	*181 – 1544*	*686.09 ± 320.24*	*.000*	*Sig*
Total	***400***	***171 – 1684***	***543.60 ± 337.91***		
Rural Non-pregnant non-lactating	*200*	*91 – 520*	*243.20 ± 74.77*		
Urban Non-pregnant non-lactating	*200*	*185 – 1169*	*499.55 ± 164.44*	*.000*	*Sig*
Total	***400***	***91 – 1169***	***371.38 ± 180.95***		
Rural Women	**800**	**75 – 1684**	**292.85 ± 191.45**		
Urban Women	**800**	**144 – 1544**	**576.59 ± 253.33**	**.000**	**Sig**
Overall (ANOVA)	**1600**	**75 – 1684**	**434.72 ± 265.56**		

Calcium intake ranged from 75 – 1684 mgs with overall mean intake of 434.72 ± 265.56 mgs. The lowest intake of calcium was (371.38 ± 180.95 mgs) among Non-pregnant Non-lactating group and highest intake of calcium was observed among lactating group (543.60 ± 337.91 mgs). There was not much difference in calcium intake among pregnant stage (421.18 ± 269.53 mgs) and Pre-pregnant stage (402.71 ± 214.33 mgs).

TABLE- 24: AVERAGE IRON INTAKE OF WOMEN (24 HOUR RECALL)

Physiological Status	Number	Iron Intake (mgs) Range	Mean ± S.D.	p value	Result
Rural Pre-pregnant	*200*	*6.25 – 15.23*	*10.0822 ± 2.0892*		
Urban Pre-pregnant	*200*	*6.69 – 16.78*	*11.1682 ± 2.0890*	*.000*	*Sig*
Total	***400***	***6.25 – 16.78***	***10.6252** ± 2.1562*		
Rural Pregnant	*200*	*4.10 – 14.25*	*8.2484 ± 2.4880*		
Urban Pregnant	*200*	*3.42 – 23.22*	*8.3622 ± 2.4789*	*.645*	*Insig*
Total	***400***	***3.42 – 23.22***	***8.3053** ± 2.4615*		
Rural Lactating	*200*	*4.80 – 10.58*	*15.0319 ± 7.6416*		
Urban Lactating	*200*	*4.84 – 9.70*	*18.7586 ± 9.0577*	*.001*	*Sig*
Total	***400***	***4.84 – 10.58***	***16.8952** ± 8.5745*		
Rural Non-pregnant non-lactating	*200*	*3.92 -12.68*	*7.8062 ± 1.9963*		
Urban Non-pregnant non-lactating	*200*	*4.42 – 15.53*	*8.5124 ± 2.2517*	*.000*	*Sig*
Total	***400***	***3.92 – 15.53***	***8.5124** ± 2.2517*		
Rural Women	**800**	**3.92 – 10.58**	**10.2922 ± 5.1326**		
Urban Women	**800**	**3.42 – 39.70**	**11.8769 ± 6.4173**	**.000**	**Sig**
Overall (ANOVA)	**1600**	**3.42 – 40.58**	**11.0845 ± 5.8626**		

Regarding Iron intake it was observed that Iron intake ranged between 3.42 – 40.58 mgs with an overall mean Iron intake as 11.0845 ± 5.8626 mgs. Women belonging to lactating group had mean iron intake of 16.8952 ±8.5745 mgs. Where as mean iron intake of Pre-pregnant women was 10.6252 ± 2.1562 mgs. Pregnant and Non-pregnant non-lactating women had almost same mean Iron intake i.e. 8.3053 ± 2.4615 and 8.5124 ± 2.2517 mgs respectively.

TABLE- 25:
DIETARY CALORIE INTAKE DEFICIT PER DAY IN COMPARISON TO ICMR RECOMMENDED INTAKE

Physiological Status	Categorized calorie percentage deficit per day								Total	
	Nil		Upto 20%		20%–40%		> 40%			
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	102	25.7	222	55.1	69	17.5	7	1.7	400	100.0
Pregnant	24	6.0	189	47.3	120	30.0	67	16.7	400	100.0
Lactating	127	31.8	205	51.2	63	15.7	5	1.3	400	100.0
Non-pregnant non-lactating	107	26.8	248	62.0	42	10.5	3	0.7	400	100.0
Overall	360	22.5	864	45.9	294	18.3	82	5.1	400	100.0

22.5% women had no calorie deficit, where as 77.5% women had insufficient calorie intake. The majority 45.9% women had upto 20% calorie deficit per day as per 24 hour recall calculations, 18.3% had calorie deficient ranging between 20% – 40% and 5.1% had greater than 40% deficits.

It can also be observed from the above table that the problem was worse among pregnant women with 94.0% pregnant women having calorie deficit of varying degrees. 47.3% pregnant women had calorie deficit upto 20%, 30% had calorie deficit ranging between 20% – 40% whereas 16.7% had more than 40% deficit and only 6% women had no calorie deficit. Proportionally Pre-pregnant women followed pregnant women in percentage of calorie deficit where 74.3% women were having calorie deficit of varying degrees. Majority of them 55.1% had calorie deficit upto 20%, 17.5% women had calorie deficit, ranging between 20% – 40%, 1.7% women had greater than 40% deficit and almost one fourth women i.e. 25.7% had no calorie deficit at all.

The percentage of Non-pregnant non-lactating women having calorie deficit of varying degrees (73.2%) was almost same as that of Pre-pregnant women. However majority of them 62.0% had calorie deficit upto 20%. 10.5% had calorie deficit ranging between 20% – 40% and only 0.7% had more than 40% deficit. 26.8% Non-pregnant non-lactating women had no calorie deficit at all.

As far as lactating women were concerned 31.8% of them had

no calorie deficit. Where as 68.2% had calorie deficit of varying degrees with 51.2% having upto 20% deficit, 15.7% having 20%-40% deficit and a minor group of lactating women 1.3% had more than 40% deficit.

TABLE- 26:
DIETARY PROTEIN INTAKE DEFICIT PER DAY IN COMPARISON TO ICMR RECOMMENDED INTAKE

Physiological Status	Categorized protein percentage deficit per day									
	Nil		Upto 20%		20%-40%		> 40%		Total	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	179	44.8	164	41.0	54	13.5	3	0.7	400	100.0
Pregnant	23	5.7	111	27.8	128	32.0	138	34.5	400	100.0
Lactating	59	14.7	227	56.8	104	26.0	10	2.5	400	100.0
Non-pregnant non-lactating	118	29.5	165	41.3	106	26.5	11	2.7	400	100.0
Overall	**379**	**23.7**	**667**	**41.7**	**392**	**24.5**	**162**	**10.1**	**400**	**100.0**

The table depicts that almost one fourth (23.5%) sample had no protein deficit. Also can be seen that the highest percentage of women showing deficit was among pregnant group (94.3%) followed by lactating women (85.3%). Percentage of Non-pregnant non-lactating women having protein deficit was 70.5%. However, the percentage was lowest among Pre-pregnant women (55.2%).

It can also be observed from the table that majority of women 34.5% having more than 40% protein deficit belonged to pregnant category and 56.8% women in lactating group had upto 20% protein deficit.

TABLE- 27:
DIETARY CALCIUM INTAKE DEFICIT PER DAY IN COMPARISON TO ICMR RECOMMENDED INTAKE

Physiological Status	Categorized Calcium percentage deficit per day									
	Nil		Upto 20%		20%-40%		> 40%		Total	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	145	36.3	95	23.8	75	18.7	85	21.2	400	100.0
Pregnant	17	4.3	14	3.5	78	19.5	291	72.7	400	100.0
Lactating	44	11.0	22	5.5	66	16.5	268	67.0	400	100.0
Non-pregnant non-lactating	142	35.5	64	16.2	76	19.0	117	29.3	400	100.0
Overall	**348**	**21.8**	**196**	**12.2**	**295**	**18.4**	**761**	**47.6**	**400**	**100.0**

Overall more than three fourth of women (78.2%) had calcium deficit and almost half of them (47.6%) had greater than 40% deficit. The calcium deficit was highest among pregnant women where more than 72.7% had above 40% deficit followed by lactating women (67.0%).

TABLE – 28:
DIETARY IRON INTAKE DEFICIT PER DAY IN COMPARISON TO ICMR RECOMMENDED INTAKE

Physiological Status	Categorized Iron percentage deficit per day									
	Nil		Upto 20%		20%–40%		> 40%		Total	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	–	–	–	–	–	–	*400*	*100.0*	*400*	*100.0*
Pregnant	–	–	–	–	*3*	*0.7*	*397*	*99.3*	*400*	*100.0*
Lactating	*49*	*12.3*	*27*	*6.7*	*65*	*16.2*	*259*	*64.8*	*400*	*100.0*
Non-pregnant non-lactating	–	–	–	–	–	–	*400*	*100.0*	*400*	*100.0*
Overall	**49**	**3.1**	**27**	**1.6**	**68**	**4.3**	**1456**	**91.0**	**400**	**100.0**

It was observed that 96.9% women had dietary iron deficit. On analysing the data it was also found that proportionally there was not much difference in dietary iron intake deficit between various physiological groups.

Furthermore overall 91.0% women had more than 40% deficit in iron intake and 4.3% had 20%– 40% deficit. Whereas 1.6% women had iron intake deficit upto 20% and only 3.1% women had no iron intake deficit.

It can be also seen that 12.3% lactating women had no dietary iron intake deficit. 16.2% lactating women had dietary iron intake deficit ranging between 20%– 40%, 6.7% of them had upto 20% deficit whereas 64.8% of them had greater than 40% iron intake deficit. As far as Pre-pregnant and Non-pregnant non-lactating women were concerned 100.0% of them had more than 40% iron intake deficit. Same was true for 99.3% women belonging to pregnant category.

TABLE- 29:
NUTRIENT INTAKE OF SAMPLE AS COMPARED TO ICMR VALUES

Physiological Status	Calorie (Kcal)			Proteins (gms)		
	RDA Kcal / Day (ICMR)	Mean ± S.D. Intake (Kcal) / day	% deficit / day	RDA gms / Day (ICMR)	Mean ± S.D. Intake (gms) / day	% deficit / day
Pre-Pregnant (n = 400)	*1875*	*1856.38 ± 185.63*	*9.680 ± 14.310*	*50.0*	*49.488 ± 8.984*	*1.024 ± 17.969*
Pregnant (n = 400)	*2175*	*1801.24 ± 279.75*	*32.483 ± 28.67*	*65.0*	*45.721 ± 11.779*	*29.660 ± 18.122*
Lactating (n = 400)	*2275*	*2366.99 ± 401.99*	*10.106 ± 18.357*	*75.0*	*63.914 ± 11.400*	*13.825 ± 14.186*
Non-pregnant non- lactating (n = 400)	*1875*	*1843.68 ± 222.64*	*9.704 ± 14.562*	*50.0*	*45.151 ± 8.616*	*9.697 ± 17.232*
Overall (n= 1600)	**1875**	**1967.07 ± 366.85**	**15.493 ± 22.154**	**50.0**	**51.068 ± 12.788**	**13.552 ± 19.868**

(Contd.)

Physiological Status	Iron (mgs)			Calcium (mgs)		
	RDA mgs / Day (ICMR)	Mean ± S.D. Intake (mgs) / day	% deficit / day	RDA mgs / Day (ICMR)	Mean ± S.D. Intake (mgs) / day	% deficit / day
Pre-Pregnant (n = 400)	*30*	*10.625 ± 2.156*	*64.583 ± 7.187*	*400*	*402.71 ± 214.33*	*- 0.678 ± 53.581*
Pregnant (n = 400)	*38*	*8.305 ± 2.461*	*78.144 ± 6.478*	*1000*	*421.18 ± 269.53*	*57.882 ± 26.953*
Lactating (n = 400)	*30*	*16.895 ± 8.574*	*43.682 ± 28.58*	*1000*	*543.60 ± 337.91*	*45.640 ± 33.791*
Non-pregnant non- lactating (n = 400)	*30*	*15.5 ± 8.512*	*71.626 ± 7.506*	*400*	*371.38 ± 180.95*	*7.156 ± 45.238*
Overall (n= 1600)	**30**	**11.561 ± 10.046**	**62.919 ± 33.956**	**400**	**434.72 ± 265.56**	**27.500 ± 48.048**

The table reveals that percent calorie deficit per day of the sample was 15.493 ± 22.154. The table further reveals that percent calorie deficit was highest among pregnant (32.483 ± 28.67) women followed by lactating women (10.106 ± 18.357). The percent calorie deficit of pregnant and non-pregnant non-lactating women was almost same.

Percent protein deficit per day was highest among pregnant women (29.660 ± 18.122) followed by lactating women (13.825 ± 14.186) and non-pregnant non-lactating women (9.697 ± 17.232) respectively. Percent protein deficit was least among pre-pregnant women (1.024 ± 17.969). The overall percent protein deficit was (13.552 ± 19.868).

Percent Iron deficit per day of women was 62.919 ± 33.956. Women belonging to all physiological categories had iron deficit with pregnant women raking at number one position. Percent calcium, deficit per day of sample was 27.500 ± 48.048.

While comparing the nutrient intake with RDA for different physiological conditions it was seen that sample consumed all the nutrients in lesser amounts with iron as worst hit nutrient followed by calcium, calories and proteins respectively.

D:ANTHROPOMETRY

TABLE- 30:
COMPARISION OF AVERAGE WEIGHT (Kg's) OF WOMEN UNDER STUDY

Physiological Status	Number	Weight in Kg's	
		Range	Mean ± S.D.
Pre-Pregnant	*400*	*36 – 77*	*51.10 ± 6.42*
Pregnant	*400*	*36 – 84*	*56.72 ± 8.48*
Lactating	*400*	*36 – 80*	*52.88 ± 9.16*
Non-Pregnant non-Lactating	*400*	*34 – 79*	*54.85 ± 8.77*
Overall	**1600**	**34 – 84**	**53.89 ± 8.53**

N.B.: Pregnant women under study belonged to Ist or 2nd Trimester.

The overall body weight of sample ranged between 34-84 Kgs with 53.89 ± 5.53 Kgs as mean body weight.

Women belonging to pre-pregnant group had mean body weight as 51.10 + 6.42 Kgs. The mean body weight of pregnant women was56.72 + 8.48 Kgs, lactating women as 52.88 + 9.16 kgs and that of non-pregnant non-lactating women was 53.89 + 8.53 kgs.

TABLE- 31:
COMPARISION OF AVERAGE HEIGHT IN Cm's.

Physiological Status	Number	Height in Cm's	
		Range	Mean ± S.D.
Pre-Pregnant	*400*	*133 – 183*	*155.40 ± 7.80*
Pregnant	*400*	*131 – 180*	*156.28 ± 6.71*
Lactating	*400*	*135 – 180*	*155.56 ± 7.30*
Non-Pregnant Non-Lactating	*400*	*136 – 177*	*155.58 ± 7.51*
Overall	**1600**	**131 - 183**	**155.70 ± 7.34**

ANOVA F = 1.141, p = .331 (Insig.)

The mean height of women was 155.70 ± 7.34 cms with range of values being 131–183 cms. The mean height among different groups was not much different and the differences were statistically insignificant.

TABLE- 32:
BMI (Wt. Kg / Ht2 m) STATUS OF STUDIED WOMEN

Physiological Status	Number	BMI (Wt. Kg / Ht^2 m)	
		Range	Mean ± S.D.
Pre-Pregnant	*400*	*15.79 – 30.61*	*21.2253 ± 2.7782*
Pregnant	*400*	*14.65 – 33.67*	*23.2761 ± 3.5855*
Lactating	*400*	*14.79 – 35.56*	*21.8333 ± 3.4545*
Non-Pregnant Non-Lactating	*400*	*15.81 – 35.11*	*22.6789 ± 3.4569*
Overall	**1600**	**14.65 – 35.56**	**22.2534 ± 3.4219**

ANOVA F = 29.515, p = .000 (Sig.)

The BMI of sample ranged from 14.65 – 35.56 kg/m² with mean BMI as 22.2534 ± 3.4219 kg/m². The BMI among pregnant women was 23.27 ± 3.58 kgs/m² and among non-pregnant non-lactating women as 22.67 ± 3.45 kg/m² as compared to 21.22 ± 2.77 kg/m² during pre-pregnant stage or 21.83 ± 3.45 kg/m² during lactating stage. These differences were significant at $p < .01$ level.

TABLE- 33:
DISTRIBUTION OF WOMEN UNDER STUDY IN RELATION TO THEIR (BMI) BODY MASS INDEX

Physiological Status	Level of BMI												Total	
	< 16.0		16.0 – 16.9		17.0 – 18.4		>18.5 - <25.0		25.0 – 29.9		30.0 – 40.4			
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	2	0.5	10	2.5	44	11.0	300	75.0	41	10.2	3	0.8	400	100.0
Pregnant	2	0.5	8	2.0	8	2.0	280	70.0	79	19.8	23	5.8	400	100.0
Lactating	8	2.0	8	2.0	38	9.5	279	69.8	57	14.3	10	2.5	400	100.0
Non-pregnant non-lactating	2	0.5	16	4.0	28	7.0	250	62.5	96	24.0	8	2.0	400	100.0
Overall	**14**	**0.9**	**42**	**2.6**	**118**	**7.4**	**1109**	**69.3**	**273**	**17.1**	**44**	**2.8**	**1600**	**100.0**

N.B.: *Pregnant Women taken for the study were in the Ist trimester of pregnancy.*
Pearson's Chi square (X^2) = 87.244, p = .000 (Sig.)

BMI Kg / m²	***Degree of Malnutrition***
< 16.0	*Severe*
16.0 – 16.9	*Moderate*
17.0 – 18.4	*Mild*
> 18.5 - < 25.0	*Normal*
25.0 – 29.9	*Obesity (Grade I)*
30.0 – 40.0	*Obesity (Grade II)*
> 40.0	*Obesity (Grade III)*

Source: James et al 1988

The above table reflects that majority of women 69.3% were normal as per classification of BMI and 30.7% of women had malnutrition of varying degrees.

The table further unfolds the fact that 19.9% women had BMI > 25 kg/m^2 whereas 10.9% women had BMI as < 18.5 kg/m^2. Also can be seen from the table that 24% of non-pregnant non-lactating mothers were overweight (BMI between 25 – 29.9 kg/m^2) and 14.0% pre-pregnant women were mildly, moderately or severely malnourished (BMI 16 – 18.5 kg/m^2).

E. DIETARY HABITS

TABLE- 34:
NATURE OF DIET OF SAMPLE UNDER STUDY

Physiological Status	Nature of Diet					
	Vegetarian		Non-Vegetarian		Total	
	No.	%age	No.	%age	No.	%age
Pre-Pregnant	*7*	*1.8*	*393*	*98.2*	*400*	*100.0*
Pregnant	*10*	*2.5*	*390*	*97.5*	*400*	*100.0*
Lactating	*6*	*1.5*	*394*	*98.5*	*400*	*100.0*
Non-pregnant non-lactating	*3*	*0.8*	*397*	*99.2*	*400*	*100.0*
Overall	**26**	**1.6**	**1574**	**98.4**	**1600**	**100.0**

Majority of (98.4%) women were non-vegetarian and only a minor fraction (1.6%) was vegetarian.

TABLE- 35:
MEAL PATTERN OF WOMEN IN DIFFERENT PHYSIOLOGICAL STATUS

Physiological Status	Number of Meals							
	3		4		5		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	*10*	*2.5*	*258*	*64.5*	*132*	*33.0*	*400*	*100.0*
Pregnant	*13*	*3.2*	*321*	*80.3*	*66*	*16.5*	*400*	*100.0*
Lactating	*17*	*4.2*	*223*	*55.8*	*160*	*40.0*	*400*	*100.0*
Non-pregnant non-lactating	*24*	*6.0*	*197*	*49.2*	*179*	*44.8*	*400*	*100.0*
Overall	**64**	**4.0**	**999**	**62.4**	**537**	**33.6**	**1600**	**100.0**

62.4% women had four meals per day, 33.6% ate five times a day and 4.0% observed three-meal pattern.

The percentage of four-meal pattern was highest (80.3%) during pregnancy and five-meal pattern highest during lactation or non-pregnant non-lactating status (40.0% and 44.8% respectively).

TABLE- 36:

TYPE OF FOOD CONSUMED BY THE SAMPLE AT BREAKFAST

Type of Food	Physiological Status								Overall	
	Pre-Pregnant		Pregnant		Lactating		Non-pregnant non-lactating			
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Namkeen tea (Salt)	352	88.0	352	88.0	323	80.8	349	87.3	1376	86.0
Sweet tea	–	–	11	2.8	68	17.0	23	5.8	102	6.4
Wheat flour roti (Kashmiri tandoori roti	206	51.5	290	72.5	351	87.8	221	55.3	1068	66.8
Mixed homemade rice flour/ maize roti	127	31.8	128	32.0	52	13.0	122	30.5	429	26.8
Milk	102	25.5	103	25.8	79	19.8	59	14.8	343	21.4
Eggs	101	25.3	86	21.5	83	20.8	49	12.3	319	19.9
Butter	75	18.8	69	17.3	70	17.5	61	15.3	275	17.2
Sattu	54	13.5	62	15.5	94	23.5	53	13.3	263	16.4
Cooked vegetables	–	–	2	0.5	7	1.8	4	1.0	13	0.8
Halwa with dry fruits	10	2.5	–	–	13	3.3	–	–	23	1.4
Sharbat (of raisins and apricots)	–	–	2	0.5	–	–	1	0.3	3	0.2

The commonest beverage used by Kashmiri women at breakfast was (Namkeen tea) salt tea (86.0%). 66.8% women had Kashmiri Tandoori roti (wheat flour roti) with this beverage. 26.8% sample consumed home-made roti (mixed rice-flour and wheat-flour). Other foods consumed by sample at breakfast include milk by 21.4% women, egg by 19.9%, butter by 17.2% and sattu (wheat-flour or mixed-rice and maize-flour) by 16.4% ladies.

Halwa with dry fruit was consumed by 3.3% lactating women at breakfast and 0.5% pregnant women drank sharbat made from raisins and apricots.

TABLE- 37:
TYPE OF FOOD COMMONLY CONSUMED BY SAMPLE AT LUNCH

Type of Food	Physiological Status									
	Pre-Pregnant		Pregnant		Lactating		Non-pregnant non-lactating		Overall	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Rice	395	98.8	398	99.5	382	95.5	363	90.8	1538	96.1
Wheat flour roti	3	0.8	4	1.0	18	4.5	23	5.8	48	3.0
Vegetable curry	398	99.5	398	99.5	388	97.0	381	95.3	1565	97.8
Pulses	27	6.8	47	11.8	8	2.0	17	4.3	99	6.2
Meat / poultry	85	21.3	114	28.5	81	20.3	82	20.5	362	22.6
Milk / curd	113	28.3	168	42.0	278	69.5	146	36.5	705	44.1
Cheese	5	1.3	–	–	5	1.3	1	0.3	11	0.7
Fruits	30	7.5	1	0.3	4	1.0	1	0.3	36	2.3
Salads	59	14.8	91	22.8	65	16.3	43	10.8	258	16.1

The above table depicts that staple food of Kashmiri's is rice as 96.1% women consumed rice at lunch and only 3.0% women consumed wheat-flour. 22.6% women used meat / poultry, 6.2% women consumed pulses and 44.1% consumed either boiled milk or curds. 16.1% women ate fruits and only 2.3% consumed salads.

The table further reveals that milk and curds were mostly consumed by lactating women (69.5%) followed by pregnant (42.0%), non-pregnant non-Lactating (36.5%) and last of all by pre-pregnant (28.3%) category.

TABLE- 38:
TYPE OF FOOD COMMONLY CONSUMED BY SAMPLE AT DINNER

Type of Food	Physiological Status									
	Pre-Pregnant		Pregnant		Lactating		Non-pregnant non-lactating		Overall	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Rice	395	98.8	398	99.5	382	95.5	363	90.8	1538	96.1
Roti (Wheat flour)	3	0.8	4	1.0	18	4.5	23	5.8	48	3.0
Vegetable curry	398	99.5	398	99.5	388	97.0	381	95.3	1565	97.8
Pulses	27	6.8	47	11.8	8	2.0	17	4.3	99	6.2
Meat / poultry	85	21.3	114	28.5	81	20.3	82	20.5	362	22.6
Milk / curds	113	28.3	168	42.0	278	69.5	146	36.5	705	44.1
Chuttnies	5	1.3	–	–	5	1.3	1	0.3	11	0.7
Fruits	111	27.7	97	24.2	92	23.2	50	12.5	350	21.9
Salads	104	26.0	18	4.5	110	27.5	53	13.2	285	17.8

While analyzing the dinner pattern it was assessed that menu for dinner was same as that for lunch except that 0.7% women include chuttnies and 21.9% women also included fruits in their meal.

TABLE - 39:
TYPE OF FOOD CONSUMED BY THE WOMEN IN THE AFTERNOON

Type of Food	Physiological Status									
	Pre-Pregnant		Pregnant		Lactating		Non-pregnant non-lactating		Overall	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Namkeen Tea	365	91.3	372	93.0	341	85.3	348	87.0	1426	89.1
Sweet Tea	10	2.5	11	2.8	30	7.5	34	8.5	85	5.3
Rice / Maize flour roti	20	5.0	50	12.5	202	50.5	150	37.5	422	26.4
Wheat flour roti	273	68.3	257	64.3	144	36.0	163	40.8	837	52.3
Sattu	–	–	80	20.0	–	–	–	–	80	5.0
Fruit juices / Shakes	22	5.5	5	1.3	23	5.8	6	1.5	56	3.5
Butter	39	9.8	32	8.0	31	7.8	32	8.0	134	8.4
Biscuits/ Snacks	85	21.3	31	7.8	22	5.5	60	15.0	198	12.4
Milk	7	1.8	–	–	–	–	–	–	7	0.4

The hot and stimulating beverage namkeen tea was consumed by 89.1% women in the afternoon, 5.3% ladies had sweet tea. 52.3% women took wheat-flour roti, 5.0% used sattu, 12.4% women consumed either biscuits or snacks.

TABLE 40:
COMMONLY CONSUMED FOOD BY WOMEN IN MID-MORNING

Type of Food	Physiological Status									
	Pre-Pregnant		Pregnant		Lactating		Non-pregnant non-lactating		Overall	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Kahwa	125	31.3	27	6.8	132	33.0	103	25.8	387	24.2
Sweet tea	3	0.8	24	6.0	142	35.5	52	13.0	221	13.8
Wheat flour roti	128	32.0	26	6.5	26	6.5	127	31.8	307	19.2
Sattu	–	–	–	–	–	–	4	1.0	4	0.3
Bakirkhawni	–	–	2	0.5	–	–	12	3.0	14	0.9
Milk	–	–	7	1.8	–	–	9	2.3	16	1.0
Fruit juice	–	–	–	–	4	1.0	–	–	4	0.3

The foods consumed in mid-morning include kahwa by 24.2% women, 19.2% had wheat flour roti, 0.9% bakirkhawnies and 0.3% had sattu with kahwa. 1.0% women consumed milk, 0.3% had fruit juice whereas 13.8% had sweet tea only.

TABLE 41:
COMMONLY CONSUMED FOOD BY WOMEN BEFORE RETIRING

Type of Food	Physiological Status									
	Pre-Pregnant		Pregnant		Lactating		Non-pregnant non-lactating		Overall	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Deserts	–	–	6	1.5	40	10.0	–	–	46	2.8
Milk	–	–	9	2.2	18	4.4	–	–	27	1.6
Gum Arabica soaked in milk	–	–	25	6.2	–	–	–	–	25	1.5
Total	–	–	40	10.0	58	14.5	–	–	98	5.9

Only 5.9% women had consumed different types of food stuffs before retiring. It was seen that 2.8% had deserts before retiring, 1.6% consumed milk and 1.5% women had gum arabica soaked in milk.

It can also be seen from above data that this meal was taken by less percent of women belonging to pregnant (10%) and lactating group (14.5%) only.

TABLE-42:
PERCENTAGE OF WOMEN CONSUMING FRUITS DAILY

Physiological Status	Inclusion of Fruits in daily diet				Total	
	Yes		No			
	No.	%age	No.	%age	No.	%age
Pre-pregnant	111	27.7	289	72.3	400	100.0
Pregnant	97	24.2	303	75.8	400	100.0
Lactating	92	23.0	308	77.0	400	100.0
Non-pregnant non-lactating	50	12.5	350	87.5	400	100.0
Overall	350	21.9	1250	78.1	1600	100.0

The table reveals that overall 21.9% women included fruits in their daily diet. The percentage of women including fruits in their daily diet was highest amohg pre-pregnant category (27.7%), followed by pregnant (24.2%), lactating (23.0%) and lastly non-pregnant non-lactating women (12.5%).

TABLE 43:
PERCENTAGE OF WOMEN CONSUMING SALADS DAILY

Physiological Status	Inclusion of Salads in daily diet					
	Yes		No		Total	
	No.	%age	No.	%age	No.	%age
Pre-pregnant	*163*	*40.8*	*237*	*59.2*	*400*	*100.0*
Pregnant	*105*	*26.3*	*295*	*73.7*	*400*	*100.0*
Lactating	*175*	*43.8*	*225*	*56.2*	*400*	*100.0*
Non-pregnant non-lactating	*96*	*24.0*	*304*	*76.0*	*400*	*100.0*
Overall	**539**	**33.7**	**1061**	**66.3**	**1600**	**100.0**

It was observed that in general majority of ladies (66.3%) did not include salads in their daily diet compared to 33.7% who did include.

However, among lactating group 43.8% included salads in daily diet followed by pre-pregnant group i.e. 40.8%. As far as pregnant and non-pregnant non-lactating women were concerned there was a very little difference between the two groups regarding inclusion of salads in daily diet.

TABLE- 44:
VEGETABLES COMMONLY CONSUMED IN SUMMER

Physiological Status	Type of vegetables consumed					
	Seasonal		All Seasonal		Legumes	
	No.	%age	No.	%age	No.	%age
Pre-Pregnant	*197*	*49.3*	*203*	*50.8*	*100*	*25.0*
Pregnant	*200*	*50.0*	*200*	*50.0*	–	–
Lactating	*200*	*50.0*	*200*	*50.0*	–	–
Non-Pregnant Non-Lactating	*200*	*50.0*	*200*	*50.0*	–	–
Overall	797	49.8	803	50.2	100	6.3

N.B. 1. *Seasonal vegetables (Brussel sprouts, Knol-khol, Nuner, Garden-cress)*

2. *All Seasonal (Cauliflower, Cabbage, Bitter Gourd, Lady-finger, Bottle Gourd, Brinjal, Spinach, Knol-khol, Brussel sprouts)*

3. *Legumes (Peas, Beans).*

Proportion of women consuming seasonal or all seasonal vegetables during summer was limited to around 50.0%. Thus 50.0% sample consumed sag (brussel sprouts), knol-khol, lisa (rumex), nunar (portulaca) and garden-cress during summer and another 50.0% consumed cauliflowers, cabbage, bottle gourd, lady-finger, spinach, knol-khol and sag.

Legumes and pulses were consumed by 6.3% women only.

TABLE- 45: COMMONLY CONSUMED VEGETABLES IN WINTER

Physiological Status	Type of vegetable consumed											
	Seasonal		All Seasonal		Legumes & Pulses		Dried Vegetables		Roots & Tubers		Lotus stem/ Quinces	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	–	–	139	34.8	386	96.5	247	61.8	203	50.8	60	15.0
Pregnant	–	–	127	31.8	395	98.8	248	62.0	241	60.3	93	23.3
Lactating	17	4.3	77	19.3	317	79.3	232	58.0	366	91.5	85	21.3
Non-pregnant non-lactating	5	1.3	24	6.0	379	94.8	210	52.5	369	92.3	104	26.0
Total	**22**	**1.4**	**367**	**22.9**	**1477**	**92.3**	**937**	**58.6**	**1179**	**73.7**	**342**	**21.4**

Proportion of women consuming all seasonal, seasonal vegetables, legumes and pulses, dried vegetables, roots and tubers etc. during winter showed that 92.3% consumed legumes and pulses during winter, 73.7% used roots and tubers, 58.6% consumed dried vegetables, 22.9% women consumed all seasonal vegetables, 21.4% ate lotus stem and quince apples and only 1.4% women consumed seasonal vegetables like knol-khol and (Brussel sprouts) sag.

TABLE- 46:

TYPE OF OIL USED FOR COOKING BY SAMPLE

Physiological Status	Type of Oil						Total	
	Mustard Oil		Refined Oil		Combination Oil			
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	263	65.7	131	32.8	6	1.5	400	100.0
Pregnant	319	79.7	78	19.5	3	0.8	400	100.0
Lactating	288	72.0	112	28.0	–	–	400	100.0
Non-pregnant non-lactating	278	69.5	118	29.5	4	1.0	400	100.0
Overall	**1148**	**71.8**	**439**	**27.4**	**13**	**0.8**	**1600**	**100.0**

The table provides data on the type of oil used. Almost three fourth (71.8%) of women replied that they used Mustard oil as cooking medium. Only a minute fraction of (0.8%) ladies used combination oil, whereas rest of ladies (27.4%) used reined oil as cooking medium.

The highest percentage (32.8%) of women using refined oil and combination oil (1.5%) belonged to pre-pregnant group.

TABLE 47: TYPE AND FREQUENCY OF FOOD CONSUMED BY WOMEN

Frequency of Food Consumption	Physiological Status	Food Groups															
		Cereals		Pulses		Green Leafy Vegetables		Roots &Tubers		Fruits		Meat / Poultry		Milk / Curd		Oils	
		No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Daily (D)	Pre-pregnant	400	100.0	–	–	398	99.5	–	–	111	27.7	85	21.3	101	25.2	400	100.0
	Pregnant	400	100.0	–	–	398	99.5	–	–	97	24.2	114	28.5	124	31.0	400	100.0
	Lactating	400	100.0	–	–	388	97.0	–	–	92	23.2	81	20.3	151	37.4	400	100.0
	Non-pregnant non-lactating	400	100.0	–	–	388	97.0	–	–	50	12.5	82	20.5	83	23.2	400	100.0
	Overall	**1600**	**100.0**	–	–	**1572**	**98.3**	–	–	**350**	**21.9**	**362**	**22.6**	**459**	**28.7**	**1600**	**100.0**
Weekly Once (W_1)	Pre-pregnant	–	–	–	–	–	–	373	93.2	–	–	–	–	–	–	–	–
	Pregnant	–	–	32	8.0	–	–	253	68.2	50	12.5	–	–	–	–	–	–
	Lactating	–	–	30	7.5	–	–	275	68.7	31	7.8	–	–	–	–	–	–
	Non-pregnant non-lactating	–	–	9	2.25	–	–	400	100.0	32	8.0	–	–	–	–	–	–
	Overall	–	–	**71**	**4.4**	–	–	**1301**	**81.3**	**113**	**7.0**	–	–	–	–	–	–
Twice in a week (W_2)	Pre-pregnant	–	–	27	6.75	–	–	–	–	89	22.3	25	6.2	13	3.2	–	–
	Pregnant	–	–	15	3.75	–	–	–	–	61	15.3	11	2.7	44	11.0	–	–
	Lactating	–	–	–	–	–	–	–	–	77	19.2	–	–	129	32.2	–	–
	Non-pregnant non-lactating	–	–	8	2.0	–	–	–	–	121	30.2	–	–	53	13.3	–	–
	Overall	–	–	**50**	**3.1**	–	–	–	–	**348**	**21.8**	**36**	**2.2**	**239**	**14.9**	–	–
4-5 times a week (W_{4-5})	Pre-pregnant	–	–	–	–	2	0.5	–	–	7	1.8	77	19.2	–	–	–	–
	Pregnant	–	–	–	–	2	0.5	–	–	–	–	45	13.7	–	–	–	–
	Lactating	–	–	–	–	12	3.0	–	–	–	–	141	35.2	–	–	–	–
	Non-pregnant non-lactating	–	–	–	–	12	3.0	–	–	–	–	173	43.2	–	–	–	–
	Overall	–	–	–	–	**28**	**1.7**	–	–	**7**	**0.4**	**436**	**27.2**	–	–	–	–

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Frequency for Food Consumption	Physiological Status	Cereals		Pulses		Green Leafy Vegetables		Roots & Tubers		Fruits		Meat / Poultry		Milk / Curd		Oils	
		No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
	non-lactating	–	–			–	–	–	–	–	–	–	–	–	–	–	–
	Overall	–	–	*1149*	*71.8*	–	–	**299**	**18.7**	–	–	–	–	–	–	–	–
	Pre-pregnant	–	–	173	43.3	–	–	–	–	193	48.3	206	51.5	286	71.6	–	–
	Pregnant	–	–	157	-39.3	–	–	–	–	192	48.0	220	55.0	232	58.0	–	–
Occasional	Lactating	–	–	–	–	–	–	–	–	200	50.0	172	43.0	120	30.4	–	–
	Non-pregnant non-lactating	–	–	–	–	–	–	–	–	197	49.3	142	35.5	264	63.5	–	–
	Overall	–	–	**330**	**20.7**	–	–	–	–	**782**	**48.9**	**740**	**46.2**	**902**	**56.4**	–	–

The above table shows that overall 100.0% women consumed cereals daily. The percentage of women consuming cereals daily was same for women belonging to pre-pregnant, pregnant, lactating as well as non-pregnant non-lactating women (100.0%).

Overall the percentage of women consuming pulses once a week was 4.4% and only 3.1% consumed pulses twice weekly. However 71.8% included pulses in their diet once monthly and 20.7% occasionally. Furthermore 6.2% pre-pregnant ladies consumed pulses twice a week, 50.0% monthly once and 43.3% ate pulses occasionally. Incase of pregnant ladies it was seen that 8.0% of them had pulses once a week, 3.7% twice a week, 49.0% once monthly and 39.3% occasionally. As far as lactating women were concerned 7.5% ate pulses once weekly and 92.5% monthly once. It was also found that 2.3% non-pregnant non-lactating women consumed pulses weekly once and 95.8% once per month.

Overall green leafy vegetables were consumed by 98.3% women daily and 1.7% women had green leafy vegetables four to five times per week only. 99.5% pre-pregnant and pregnant women consumed green leafy vegetables daily and 0.5% four to five times per week. 97.0% lactating and non-pregnant non-lactating women consumed green leafy vegetables on daily basis and 3.0% had green-leafy vegetables four to five times per week.

21.9% women had fruits daily, 7.0% once a week, 21.8% twice a week, 0.4% 4-5 times per week and 48.8% of them ate fruits occasionally. The data from food frequency table further reveals that 27.7% pre-pregnant women consumed fruits daily, 22.3% twice a week 1.8% 4-5 times per week and 48.3% occasionally. It was also seen that 24.2% pregnant women included fruits daily in their diet, whereas 12.5% once a week, 15.3% twice a week and 48.0% occasionally. 23.0% lactating women included fruits daily in their diet, 7.8% once a week, 19.2% twice a week and 50.0% occasionally. As far as consumption of fruits by non-pregnant non-lactating women is concerned it was observed that 12.5% of them ate fruits daily, 8.0% once a week, 30.2% twice a week and 49.3% occasionally.

Overall 22.6% women consumed meat and poultry daily, 7.0% once a week, 2.2% twice a week, 27.2% 4-5 times/ week and 46.2% occasionally. Regarding pre-pregnant women it was found that 21.3% of them included meat / poultry daily in their diet, 6.2% twice a week, 19.2% 4-5 times / week and51.5% occasionally, whereas 28.5% pregnant women had meat / poultry daily, 2.7% twice a week, 13.7% 4-5 times per week and 55.0% occasionally. In lactating ladies it was found that 20.3% included meat / poultry daily in their diet 35.2% 4-5 times / week and 43.0% occasionally.

Observation regarding non-pregnant non-lactating women

showed that 20.5% of them consumed meat / poultry daily, 43.2% 4-5 times / week and last of all 35.5% occasionally.

Milk and curds were consumed by 28.7% women daily, 14.9% consumed same twice in a week and 56.4% occasionally.

Oils were consumed by (100.0%) all women on daily basis.

TABLE 48: PERCENTAGE DISTRIBUTION OF WOMEN BY FOOD LIKES

Type of Food	Physiological Status								Overall	
	Pre-pregnant		Pregnant		Lactating		Non-pregnant non-lactating			
	No.	% age	No.	% age	No.	% age	No.	% age	No.	% age
1. Cereals										
a. *Rice*	90	22.5	76	19.0	127	31.8	54	13.5	347	21.7
b. *Wheat*	2	0.5	3	0.8	8	2.0	2	0.5	15	0.9
2. Pulses and Legumes										
a. *Rajmah*	132	33.0	129	32.3	96	24.0	70	17.5	427	26.7
b. *Green Gram*	–	–	36	9.0	90	22.5	88	22.0	214	13.3
3. Milk and milk products										
a. *Cheese*	15	3.7	–	–	10	2.5	7	1.7	32	2.0
b. *Curd*	125	31.2	175	43.7	303	75.7	150	37.5	753	47.0
c. *Milk*	139	34.7	123	30.7	89	22.2	76	19.0	427	26.6
4. Meat, Fish, Poultry										
a. *Meat*	53	13.2	61	15.3	46	11.5	78	19.5	239	14.9
b. *Fish*	20	5.0	23	5.8	36	9.0	44	11.0	123	7.7
c. *Poultry*	83	20.8	58	14.5	67	16.8	89	22.3	297	18.6
5. Vegetables										
a. *Knol-Khol*	150	37.5	72	18.0	132	33.0	142	35.5	496	31.0
b. *Spinach*	115	28.8	192	48.0	145	36.2	112	28.0	564	32.7
c. *Sag (Brussel sprouts)*	161	40.3	159	39.8	115	28.8	135	33.8	570	35.6
d. *Dried Bottle Gourd / Brinjals*	–	–	–	–	–	–	5	1.3	5	0.3

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	Type of Food	Physiological Status								Overall	
		Pre-pregnant		Pregnant		Lactating		Non-pregnant non-lactating			
		No.	% age	No.	% age	No.	% age	No.	% age	No.	% age
e.	*Cauliflower*	*14*	*3.5*	*14*	*3.5*	*19*	*4.7*	*9*	*2.3*	*56*	*3.5*
6.	**Roots and tubers**										
a.	*Potatoes*	*14*	*3.5*	*13*	*3.3*	*4*	*1.0*	*13*	*3.3*	*44*	*2.8*
7.	**Fruits**										
a.	*Apples and Citrus Fruits*	*130*	*32.5*	*108*	*27.0*	*123*	*30.8*	*79*	*19.7*	*440*	*27.5*
b.	*Dry Fruits*	*12*	*3.0*	*11*	*2.8*	*54*	*13.5*	*17*	*4.3*	*94*	*5.8*
8.	**Miscellaneous**										
a.	*Soft Drinks*	*11*	*2.8*	–	–	*5*	*1.3*	–	–	*16*	*1.0*
b.	*Fast Foods*	*13*	*3.3*	–	–	*11*	*2.8*	*3*	*0.8*	*27*	*1.7*
c.	*Chuttnies*	*8*	*2.0*	*30*	*7.5*	*23*	*5.8*	–	–	*61*	*38*
d.	*Pickees*	*192*	*48.0*	*189*	*47.3*	*128*	*32.0*	*98*	*24.5*	*607*	*37.9*

The above table shows that rice among cereals was liked by 21.7% women and wheat by 0.9% ladies only.

Among legumes and pulses Rajmah was the main pulse liked by 26.7% women followed by green gram which was liked by 13.3% women only.

Curds ranked at number one position among milk and milk products group which was liked by 47.0% women, followed by milk liked by 26.6% ladies. Whereas cheese was liked by 2.0% women.

It was further seen that among animal foods poultry was the most liked food item (18.6%) followed by meat (14.9%) and lastly fish (7.7%). Among vegetables sag (Brussel sprouts) was most liked vegetable (35.6%) followed by spinach (32.7%) and knol-khol (31.0%). 3.5% women liked cauliflower where as 0.3% women liked dried bottle gourd and brinjals also. From Roots and tubers 2.8% women liked potatoes.

27.5% women liked apples and citrus fruits, mainly oranges and grapes. 5.8% women liked walnuts, almonds and cashewnuts.

From miscellaneous group pickles ranked as the first food item liked by 37.9% women followed by chuttnies (3.8%), fast foods (1.7%) and lastly soft drinks (1.0%).

TABLE 49: PERCENTAGE DISTRIBUTION OF WOMEN BY FOOD DISLIKES

Type of Food	Physiological Status									
	Pre-pregnant		Pregnant		Lactating		Non-pregnant non-lactating		Overall	
	No.	% age	No.	% age	No.	% age	No.	% age	No.	% age
1. Cereals										
a. *Rice*	19	4.8	45	11.3	3	0.8	2	0.5	69	4.3
b. *Wheat*	3	0.8	12	3.0	5	1.3	7	1.8	27	1.7
2. Milk and milk products										
a. *Milk*	19	4.8	4	1.0	9	2.3	15	3.8	47	2.9
3. Meat, Fish, Poultry										
a. *Meat*	34	8.5	48	12.0	8	2.0	9	2.3	99	6.2
b. *Fish*	12	3.0	26	6.5	5	1.3	12	3.0	55	3.4
c. *Poultry*	27	6.8	27	6.8	13	3.3	13	3.3	83	5.2
4. Vegetables										
a. *Knol-Khol*	37	9.3	192	48.0	9	2.3	24	6.0	107	6.7
b. *Bitter gourd*	–	–	7	1.8	24	6.0	25	6.3	56	3.5
c. *Lady finger*	46	10.1	98	24.5	–	–	79	19.7	223	13.9
d. *Dried Beans*	1	0.3	–	–	8	2.0	1	0.3	10	0.6
5. Miscellaneous										
a. *Sweets and Honey*	–	–	229	57.2	4	1.0	1	0.3	234	14.6
b. *Pastries / Cakes*	–	–	–	–	2	0.5	46	11.5	48	3.0

Commonly disliked foods by women were rice by 4.3% and wheat by 1.7% from cereal group. A minor fraction of women (2.9%) disliked milk.

Similarly 6.20% women disliked meat, 6.8% had disliking for poultry and 3.4% disliked fish from animal food category.

Most disliked vegetable by women was ladyfinger (13.9%) followed by knol-khol (6.7%), bitter gourd (3.5%) and lastly dried beans (0.6%).

14.6% women disliked sweets and honey whereas 3.0% disliked cakes and pastries.

TABLE- 50:

PERCENTAGE OF WOMEN FOLLOWING FOOD TABOOS

Physiological Status	Food Taboos Followed				Total	
	Yes		No			
	No.	% age	No.	% age	No.	% age
Pre-pregnant	265	66.2	135	33.8	400	100.0
Pregnant	246	61.5	154	38.5	400	100.0
Lactating	301	75.2	99	24.8	400	100.0
Non-pregnant non-lactating	266	66.5	134	33.5	400	100.0
Overall	**1078**	**67.4**	**522**	**32.6**	**1600**	**100.0**

67.4% women followed different food taboos whereas 32.6% didn't follow any taboos.

The percentage of women from lactating group following food taboos was the most (75.2%). The percentage was almost same incase of non-pregnant non-lactating (66.5%) and pre-pregnant (66.2%) women, whereas pregnant women ranked at number four positions in this regard (61.5%).

TABLE - 51: TYPES OF FOOD TABOOS FOLLOWED BY SAMPLE

Food Taboos	Physiological Status								Overall	
	Pre-pregnant		Pregnant		Lactating		Non-pregnant non-lactating			
	No.	% age	No.	% age	No.	% age	No.	% age	No.	% age
1. Consumption of fish and curd together	212	80.0	218	88.6	161	53.5	141	53.0	732	67.9
2. Consumption of fish and milk together	163	61.5	196	79.7	182	60.5	153	57.5	694	64.4
3. Consumption of curds and dal together	62	23.4	44	17.9	95	31.6	94	35.3	295	27.4
4. Consumption of peaches and curd together	53	20.0	64	26.0	25	8.3	5	1.9	147	13.6
5. Consumption of tomato and curds together	54	20.4	98	39.8	65	21.6	43	16.2	260	24.1
6. Consumption of cheese and curds together	2	0.8	–	–	–	–	–	–	2	0.2
7. Consumption of eggs and milk together	–	–	1	0.4	36	12.0	20	7.5	57	5.3
8. Consumption of eggs and dal together	–	–	–	–	2	0.7	15	5.6	17	1.6
9. Discarding cooking water of spinach	46	17.4	69	28.0	61	20.3	61	22.9	237	22.0
10. Avoid consumption of fresh fruits and vegetables upto 40 days after delivery	–	–	–	–	17	5.6	–	–	17	1.6
11. Excessive intake of fish during lactating	–	–	–	–	4	1.3	–	–	4	0.4

N.B.'Percentages have been calculated from Number of women following food taboos.

Assessing information on food taboos followed by women, the data shows that 67.9% women didn't consume fish and curds together. The next common food taboo is for consumption of fish and milk (64.4%) together.

Other food taboos, which were followed by ladies, were consumption of curds and dal (pulses) together (27.4%), curds and tomato (24.1%), consumption of peaches and curds (13.6%), and cheese and curds (0.2%).

5.3% women avoided consumption of eggs and milk together and 1.6% eggs and dal (pulses).

22.0% women discarded cooking water of spinach,. 1.6% lactating women avoided consumption of fresh fruits and vegetables upto 40 days after delivery and 0.4% lactating women believed that excessive intake of fish during lactation will increase milk production and quality of milk.

TABLE- 52:
PERCENTAGE OF WOMEN CONSUMING SPECIAL FOODS DURING PREGNANCY AND LACTATION

Physiological Status	Special Foods Consumed during Pregnancy and Lactation				Total	
	Yes		No			
	No.	% age	No.	% age	No.	% age
Pregnant	*196*	*49.0*	*204*	*51.5*	*400*	*100.0*
Lactating	*358*	*89.5*	*42*	*10.5*	*400*	*100.0*
Overall	**554**	**69.3**	**246**	**30.7**	**800**	**100.0**

N.B. This was specific question only for pregnant and lactating women.

Overall about 69.3% women were using special foods during pregnancy and lactation. However the percentage was much higher (89.5%) among lactating women compared to pregnant women (49.0%).

TABLE- 53:
TYPES OF SPECIAL FOODS CONSUMED BY PREGNANT AND LACTATING WOMEN UNDER STUDY

Types of Food	Physiological Status				Total	
	Pregnant		Lactating			
	No.	% age	No.	% age	No.	% age
1 Fruit juices	57	29.1	21	5.9	78	14.1
2 Milk and milk products	54	17.3	54	15.1	88	15.9
3 Corn flakes / Oat meal	2	1.0	8	2.2	10	1.8
4 Dry fruit	27	13.8	43	12.0	70	12.6
5 Gum Arabica soaked in milk	25	12.8	–	–	25	4.5
6 Quince seeds soaked in water	24	12.2	–	–	24	4.3
7 Sharbat (extract of raisins and apricot)	18	9.2	–	–	18	3.2
8 Deserts and sweets	6	3.1	40	11.2	46	8.3
9 Fish	6	3.1	36	10.1	42	7.6
10 Extra amounts of meat and organ meat	25	12.8	65	18.2	90	16.3
11 Shakes	10	5.1	7	2.0	17	3.1
12 Health drinks	1	0.5	–	–	1	0.2
13 Ghee / Butter	–	–	36	10.1	36	6.5
14 Kitchri	–	–	55	15.4	55	9.9
15 Garden cress	2	1.0	109	30.4	111	20.0

N.B. Percentage have been calculated from the number of women following food taboos

The most commonly consumed special food during lactation was garden cress which was consumed by (30.4%) women, other special foods consumed by this group were meat and organ meat (18.2%), milk and milk products (15.1%), fruit juices (5.9%). (10.1%) lactating women consumed fish as special food as they believed that it would increase milk production.

(29.1%) pregnant women consumed fruit juices whereas (17.3%) consumed milk and milk products, (13.8%) women used dry fruits as special food. Other special foods consumed during pregnancy included gum arabica soaked in milk or water (12.8%), Quince seeds soaked in water (12.2%) and sharbats of raisins and apricots (9.2%) women.

F: NUTRITIONAL KNOWLEDGE

TABLE- 54: OVERALL NUTRITIONAL KNOWLEDGE AMONG WOMEN

Physiological Status	Nutritional Knowledge							
	Good		Fair		Poor		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	*108*	*27.0*	*193*	*48.2*	*95*	*23.8*	*400*	*100.0*
Pregnant	*86*	*21.5*	*103*	*25.7*	*211*	*52.8*	*400*	*100.0*
Lactating	*68*	*17.0*	*82*	*20.5*	*250*	*62.5*	*400*	*100.0*
Non-pregnant non-lactating	*81*	*20.2*	*145*	*36.3*	*174*	*43.5*	*400*	*100.0*
Overall	**343**	**21.4**	**523**	**32.7**	**734**	**45.9**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 185.187, p = .000 (Sig)

The above table reveals that almost half of ladies (45.9%) under study had poor nutritional knowledge, whereas 32.7% had fair knowledge and only 21.4% possessed good nutritional knowledge.

Also can be seen that most of ladies who were nutritionally aware were from Pre-pregnant group (27.0%) followed by pregnant (21.5%), Non-pregnant non-lactating (20.2%), and last of all lactating women (17.0%).

The least nutritionally knowledgeable group (poor) belonged to lactating group (62.5%), followed by pregnant women (52.8%), Non-pregnant non-lactating (43.5%) and Pre-pregnant ladies (23.8%).

TABLE- 55: NUTRITIONAL KNOWLEDGE AMONG WOMEN REGARDING SOURCES AND FUNCTIONS OF NUTRITIENTS

Physiological Status	Knowledge regarding Sources & Functions of Nutrients							
	Good		Fair		Poor		Total	
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	*130*	*32.5*	*56*	*14.0*	*214*	*53.5*	*400*	*100.0*
Pregnant	*144*	*36.0*	*41*	*10.2*	*215*	*53.8*	*400*	*100.0*
Lactating	*108*	*27.0*	*52*	*13.0*	*240*	*60.0*	*400*	*100.0*
Non-pregnant Non-lactating	*127*	*31.8*	*81*	*20.2*	*192*	*48.0*	*400*	*100.0*
Overall	**509**	**31.8**	**230**	**14.4**	**861**	**53.8**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 25.446, p = .000 (Sig)

The table indicates overall knowledge on source and functions of nutrients and it can be seen that 53.8% women had poor knowledge regarding sources and functions of nutrients, 14.4% women had fair knowledge and 31.8% possessed good knowledge ($p < .001$). These differences were significant statistically. The table further reveals that 53.5% Pre-pregnant women had poor knowledge where as 14.0% had fair knowledge and 32.5% were having good knowledge.

Percentage wise 48.0% Non-pregnant non-lactating women had poor knowledge on sources and functioning of nutrients as compared to around 53% among pregnant or Pre-pregnant women. The worst being 60.0% among lactating group. Similarly percentage wise 36.0% pregnant women had good knowledge on source and functions of nutrients followed by around 32.0% among Non-pregnant non-lactating or Pre-pregnant group or 27% among lactating group.

TABLE- 56:
NUTRITIONAL KNOWLEDGE AMONG WOMEN REGARDING NUTRITIONAL REQUIREMENTS

Physiological Status	Knowledge Regarding Nutritional Requirements						Total	
	Good		Fair		Poor			
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	*170*	*42.5*	*158*	*39.5*	*72*	*18.0*	*400*	*100.0*
Pregnant	*105*	*26.2*	*138*	*34.5*	*157*	*39.3*	*400*	*100.0*
Lactating	*104*	*26.0*	*157*	*39.3*	*139*	*34.7*	*400*	*100.0*
Non-pregnant Non-lactating	*144*	*36.0*	*158*	*39.5*	*98*	*24.5*	*400*	*100.0*
Overall	**523**	**32.7**	**611**	**38.2**	**466**	**29.1**	**1600**	**100.0**

Pearson Chi – Square (x^2)= 63.933, p = .000 (Sig)

Assessment of knowledge on nutrient requirements showed that in general only 29.1% of women had poor knowledge regarding

nutritional requirements, whereas 38.2% had fair knowledge and 32.7% had a good knowledge.

Majority of Pre-pregnant women (42.5%) followed by Non-pregnant non-lactating women (36.0%) had good and majority of pregnant (39.3%) followed by lactating mothers (34.7%) had poor knowledge. The differences being significant ($p < .001$).

TABLE- 57:

NUTRITIONAL KNOWLEDGE AMONG WOMEN REGARDING COOKING PRACTICES AND NUTRIENT LOSS

Physiological Status	Knowledge Regarding Cooking Practices and Nutrient Loss						Total	
	Good		Fair		Poor			
	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	*177*	*44.3*	*142*	*35.5*	*81*	*20.2*	*400*	*100.0*
Pregnant	*69*	*17.2*	*119*	*29.8*	*212*	*53.0*	*400*	*100.0*
Lactating	*46*	*11.5*	*134*	*33.5*	*220*	*55.0*	*400*	*100.0*
Non-pregnant Non-lactating	*102*	*25.5*	*116*	*29.0*	*182*	*45.5*	*400*	*100.0*
Overall	**394**	**24.6**	**511**	**31.9**	**695**	**43.4**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 181.973, p = .000 (Sig)

Assessment of nutritional knowledge regarding cooking practices and nutrient loss showed that majority of women (43.4%) had poor knowledge regarding proper and scientific methods of cooking, which leads to wastage of nutrients during cooking by traditional methods. Only (24.6%) ladies had good knowledge in this regard. Poor knowledge was proportionally high among pregnant (53.0%) and lactating mothers (55.0%) compared to Pre-pregnant group (20.2%). Good knowledge was proportionally better among pregnant group (44.3%).

G: RELATIONSHIP OF VARIOUS SOCIO-EPIDEMOLOGICAL FACTORS WITH NUTRIENT INTAKE

TABLE- 58: PERCENTAGE OF WOMEN WITH DIFFERENT CALORIE INTAKE PER DAY WITH RELATION TO AGE

Physiological Status	Grouped Age (Yrs)	Calorie intake / day: Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age
	≤ 20	15	11.3	117	88.7	132	100.0
Pre-pregnant	21-30	82	33.7	161	66.3	243	100.0
	> 30	50	20.0	20	80.0	25	100.0
	Total	**102**	**25.5**	**298**	**74.5**	**400**	**100.0**
	≤ 20	–	–	84	100.0	84	100.0
Pregnant	21-30	16	8.9	263	91.1	279	100.0
	> 30	8	21.6	29	78.4	37	100.0
	Total	**24**	**6.0**	**376**	**94.0**	**400**	**100.0**
	≤ 20	7	43.8	9	56.2	16	100.0
Lactating	21-30	87	32.2	183	67.8	270	100.0
	> 30	33	29.0	81	71.0	114	100.0
	Total	**127**	**31.8**	**273**	**68.2**	**400**	**100.0**
	≤ 20	–	–	2	100.0	2	100.0
Non-pregnant Non-lactating	21-30	28	28.6	70	71.4	98	100.0
	> 30	47	23.5	143	76.5	200	100.0
	Total	**107**	**26.8**	**293**	**73.2**	**400**	**100.0**
	≤ 20	**22**	**9.4**	**212**	**90.6**	**234**	**100.0**
Overall	**21-30**	**213**	**23.9**	**677**	**76.1**	**890**	**100.0**
	> 30	**125**	**26.3**	**351**	**73.7**	**476**	**100.0**
	Total	**360**	**22.5**	**1240**	**77.5**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 31.925, p .000 (Sig)

The above table depicts percentage of women with calorie intake and it can be seen that in the overall group highest percentage of women (90.6%) with below normal calorie intake was in the age group ≤ 20 years.

The percentage of women with below normal calorie intake was similar for pregnant and Non-pregnant non-lactating women (i.e. cent percent). However, only 88.7% Pre-pregnant ladies in same age group had low calorie intake and lowest i.e. 56.2% among lactating women.

TABLE- 59:

MEAN CALORIE INTAKE (Kcal) PER DAY WITH RELATION TO AGE

Physiological Status	Grouped Age (Yrs)	Calorie Intake (Kcal) / Day Range	Mean $\pm$ S.D.	p-value	Result
Pre-pregnant	$\leq$ 20 (n = 132)	1297 – 2396	1881.42 $\pm$ 215.35	.116	Insig.
	21-30 (n = 243)	1317 – 2478	1847.14 $\pm$ 172.09		
	> 30 (n = 25)	1565 – 2024	1813.92 $\pm$ 122.27		
	Total (n = 400)	1297 – 2478	1856.38 $\pm$ 185.63		
Pregnant	$\leq$ 20 (n = 84)	1092 – 2221	1690.51 $\pm$ 254.35	.000	Sig.
	21-30 (n = 279)	1062 – 2575	1810.90 $\pm$ 283.60		
	> 30 (n = 37)	1596 – 2305	1979.76 $\pm$ 187.29		
	Total (n = 400)	1062 – 2575	1801.24 $\pm$ 279.75		
Lactating	$\leq$ 20 (n = 16	1712 – 2923	2529.24 $\pm$ 384.82	.216	Insig.
	21-30 (n = 270)	1184 – 3029	2365.84 $\pm$ 413.92		
	> 30 (n = 114)	1596 – 3057	2346.92 $\pm$ 372.74		
	Total (n = 400)	1184 – 3057	2366.99 $\pm$ 401.99		
Non-pregnant Non-lactating	$\leq$ 20 (n = 2)	1929 – 1929	1928.80 $\pm$ .00	.843	Insig.
	21-30 (n = 98)	1364 – 2303	1838.89 $\pm$ 242.09		
	> 30 (n = 300)	1125 – 2402	1844.68 $\pm$ 216.97		
	Total (n = 400)	1125 – 2402	1843.68 $\pm$ 222.64		
Overall	$\leq$ 20 (n = 234)	1092 – 2923	1857.59 $\pm$ 316.32		
	21-30 (n = 890)	1062 – 3029	1992.23 $\pm$ 390.52		
	> 30 (n = 476)	1125 – 3057	1973.85 $\pm$ 333.75		
	Total (n = 1600)	1062 - 3057	1967.07 $\pm$ 366.85		

< or = 20 years p = .000 (Sig.), 21 – 30 years p = .000 (Sig.), > 30 years p = .000 (Sig.)

The calorie intake in relation to different ages showed that mothers $\leq$ 20 years age had lowest mean calorie intake of 1857.59 $\pm$ 316.32 Kcals, whereas it was better in 21-30 years or 30 years and above. This consistency was seen in almost all groups. While advancing age showed increased intake of calories among pregnant group from 1690.51 $\pm$ 254.35 Kcals in age group of $\leq$ 20 years to 1810.90 $\pm$ 283.60 Kcals in 21-30 years and 1979.76 $\pm$ 187.29 Kcals in > 30 years of age group. A similar observation is seen in Pre-pregnant and Non-pregnant non-lactating group. However, among lactating group the table shows reverse of these findings i.e. the calorie intake is decreasing with increasing age and intake of 2529.24 $\pm$ 384.82 Kcals in $\leq$ 20 years of age group to 2346.92 $\pm$ 372.74 by > 30 years of age group. However, these findings are statistically insignificant except in the pregnant group of women.

TABLE- 60:
PERCENTAGE OF WOMEN WITH DIFFERENT CALORIE INTAKE PER DAY IN RELATION TO SOCIO-ECONOMIC STATUS

Physiological Status	Socio Economic Status	Calorie Intake / day: Normal		Below Normal		Total	
		No.	%age	No.	%age	No.	%age
	Low	3	6.1	46	93.9	49	100.0
	Lower-middle	12	12.6	83	87.4	95	100.0
Pre-pregnant	Upper-middle	21	32.8	43	67.2	64	100.0
	High	66	34.4	126	65.6	192	100.0
	Total	**102**	**25.5**	**298**	**74.5**	**400**	**100.0**
	Low	–	–	55	100.0	50	100.0
	Lower-middle	–	–	103	100.0	103	100.0
Pregnant	Upper-middle	3	6.0	47	94.0	50	100.0
	High	21	10.9	171	89.1	192	100.0
	Total	**24**	**6.0**	**376**	**94.0**	**400**	**100.0**
	Low	21	30.9	47	69.1	68	100.0
	Lower-middle	18	33.3	36	66.7	54	100.0
Lactating	Upper-middle	38	55.9	30	44.1	68	100.0
	High	50	23.8	160	76.2	210	100.0
	Total	**127**	**31.8**	**273**	**68.2**	**400**	**100.0**
	Low	15	31.2	33	68.8	48	100.0
	Lower-middle	17	23.9	54	76.1	71	100.0
Non-pregnant Non-lactating	Upper-middle	19	23.8	61	76.2	80	100.0
	High	56	27.9	145	72.1	201	100.0
	Total	**107**	**26.8**	**293**	**73.2**	**400**	**100.0**
	Low	**39**	**17.7**	**181**	**82.2**	**220**	**100.0**
	Lower-middle	**47**	**14.6**	**276**	**85.4**	**323**	**100.0**
Overall	**Upper-middle**	**81**	**30.9**	**181**	**69.1**	**262**	**100.0**
	High	**193**	**24.3**	**602**	**75.7**	**795**	**100.0**
	Total	**360**	**22.5**	**1240**	**77.5**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 31.925, p .000 (Sig)

On the whole the percentage of women with normal calorie intake was highest among those belonging to upper-middle (30.9%) and high SES (24.3%).

Same was true for Pre-pregnant group with 34.4% women having normal calorie intake belonging to high SES and 32.8% to upper-middle class.

As far as pregnant women were concerned they also followed same trend with 6.0% women with normal calorie intake belonging

to upper-middle SES and 10.9% belonging to high SES.

However incase of lactating mothers the percentage of women with normal calorie intake was highest among women of upper-middle class (55.9%) followed by lower-middle class (33.3%).

Furthermore it can be also seen that incase of Non-pregnant non-lactating group the percentage of ladies with normal calorie intake was highest among women of low SES (31.2%) followed by women of high SES (27.9%).

TABLE- 61: MEAN CALORIE INTAKE PERDAY OF WOMEN IN RELATION TO SOCIO-ECONOMIC STATUS

Physiological Status	Socio-economic Status	Calorie intake (Kcal) / Day Range	Mean ± S.D.	p-value	Result
Pre-pregnant	Low (n = 49)	1614 – 2270	1853.56 ± 173.10	.029	Insig.
	Lower-middle (n = 95)	1297 – 2478	1905.56 ± 223.14		
	Upper-middle (n = 64)	1424 – 2200	1838.30 ± 159.72		
	High (n = 192)	1317 – 2206	1838.79 ± 172.94		
	Total (n = 400)	**1297 – 2478**	**1856.38 ± 185.63**		
Pregnant	Low (n = 55)	1062 – 2048	1673.30 ± 251.04	.000	Sig.
	Lower-middle (n = 103)	1092 – 2221	1675.93 ± 268.79		
	Upper-middle (n = 50)	1265 – 2196	1832.54 ± 239.76		
	High (n = 192)	1184 – 2575	1896.96 ± 264.00		
	Total (n = 400)	**1062 – 2575**	**1801.24 ± 279.75**		
Lactating	Low (n = 68)	1904 – 3029	2523.71 ± 303.08	.000	Sig.
	Lower-middle (n = 54)	1320 – 2914	2487.30 ± 402.95		
	Upper-middle (n = 68)	1711 – 2921	2516.81 ± 359.81		
	High (n = 210)	1184 – 3057	2236.79 ± 400.39		
	Total (n = 400)	**1184 – 3057**	**2366.99 ± 401.99**		
Non-pregnant Non-lactating	Low (n = 48)	1659 – 2334	1942.25 ± 176.80	.000	Sig.
	Lower-middle (n = 71)	1426 – 2402	1931.63 ± 162.17		
	Upper-middle (n = 80)	1329 – 2192	1898.17 ± 208.17		
	High (n = 201)	1125 – 2303	1767.39 ± 230.45		
	Total (n = 400)	**1125 – 2402**	**1843.68 ± 222.64**		
Overall	**Low (n = 220)**	**1062 – 3029**	**2034.98 ± 416.15**	**.000**	**Sig.**
	Lower-middle (n = 323)	**1092 – 2914**	**1935.32 ± 377.82**		
	Upper-middle (n = 262)	**1265 – 2921**	**2031.58 ± 383.21**		
	High (n = 795)	**1125 – 3057**	**1939.92 ± 336.60**		
	Total (n = 1600)	**1062 - 3057**	**1967.07 ± 366.85**		

The overall mean calorie intake of women with low SES was highest (2034.98 ± 416.15 Kcals), followed by mean calorie intake in women of upper-middle class (2031.58 ± 383.21 Kcals), lower-middle (1935.32 ± 377.82 Kcals) and finally that of women with high SES (1939.92 ± 336.60 Kcals) respectively. These differences were statistically significant ($p < .0001$).

The mean calorie intake of various socio-economic classes in different physiological states was again not much different. The mean calorie intake of Pre-pregnant women belonging to low, upper-middle and high socio-economic groups were 1853.56 ± 173.10 Kcals, 1838.30 ± 159.72 Kcals and 1838.79 ± 172.94 Kcals respectively. However, mean calorie intake of Pre-pregnant women belonging to lower-middle class was slightly higher (1905.56 ± 223.14 Kcals) and this difference was ($p = .029$) statistically insignificant.

In pregnant women there was an increase in mean calorie intake of women as the SES goes up i.e., the mean calorie intake of women with low SES was 1673.30 ± 251.04 Kcals for lower-middle class it was 1675.93 ± 239.76, followed by women of upper-middle (1832.54 ± 239.76 Kcals) and high class (1896.96 ± 264.00 Kcals) respectively. These difference were statistically significant ($p = .000$).

As far as lactating mothers were concerned there was not much difference in the mean calorie intake of women belonging to low (2523.71 ± 303.08 Kcals), lower-middle (2487.30 ± 402.95 Kcals) and upper-middle (2516.81 ± 359.81 Kcals). The only exception to this were women of high SES category, whose intake was slightly less than other women (2236.79 ± 400.39 Kcals). This difference was statistically significant ($p = .000$).

In case of Non-pregnant non-lactating women, as the SES goes up the mean calorie intake was lowered. The mean calorie intake was 1942.25 ± 176.80 Kcals for women of low SES, 1931.63 ± 162.17 Kcals for lower-middle class women. It was 1898.17 ± 208.17 Kcals for women of upper-middle class and 1767.39 ± 230.45 Kcals for women belonging to high SES, with $p = .000$. These differences in mean calorie intake were statistically significant.

TABLE- 62:
PERCENTAGE OF WOMEN WITH DIFFERENT CALORIE INTAKE PER DAY WITH RELATION OF TYPE TO FAMILY

Physiological Status	Type of Family	Calorie intake / day Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age	p-value	Result
	Joint	*85*	*23.4*	*278*	*76.6*	*363*	*100.0*		
Pre-pregnant	*Nuclear*	*17*	*45.9*	*20*	*54.1*	*37*	*100.0*	*.003*	*Sig.*
	Total	***102***	***25.5***	***298***	***74.5***	***400***	***100.0***		
	Joint	*20*	*6.0*	*313*	*94.0*	*333*	*100.0*		
Pregnant	*Nuclear*	*4*	*6.0*	*63*	*94.0*	*67*	*100.0*	*.991*	*Insig.*
	Total	***24***	***6.0***	***376***	***94.0***	***400***	***100.0***		
	Joint	*106*	*36.8*	*182*	*63.2*	*288*	*100.0*		
Lactating	*Nuclear*	*21*	*18.8*	*91*	*81.2*	*112*	*100.0*	*.000*	*Sig.*
	Total	***127***	***31.8***	***273***	***68.2***	***400***	***100.0***		
	Joint	*51*	*25.9*	*146*	*74.1*	*197*	*100.0*		
Non-pregnant Non-lactating	*Nuclear*	*56*	*27.6*	*147*	*72.4*	*203*	*100.0*	*.701*	*Insig.*
	Total	***107***	***26.7***	***293***	***73.3***	***400***	***100.0***		
	Joint	**262**	**22.2**	**919**	**77.8**	**1181**	**100.0**		
Overall	**Nuclear**	**98**	**23.4**	**321**	**76.6**	**419**	**100.0**	.612	Insig.
	Total	**360**	**22.5**	**1240**	**77.5**	**1600**	**100.0**		

The above table shows that in general there was not much difference in the calorie intake of women living in nuclear (23.4%) and joint families. However percentage of Pre-pregnant women living in nuclear families with normal calorie intake was higher (45.9%) than women of same group living in joint families (23.4%).

As far as lactating women were concerned those living in joint families had advantage with percentage of women with normal intake being higher (36.8%) as compared to those living in nuclear families (18.8%).

There was a little difference in the percentage of women with normal calorie intake living in joint (25.9%) families and nuclear families (27.6%) among Non-pregnant non-lactating group whereas during pregnant state there was no difference in percentage of women belonging to nuclear and joint families at all as far as their calorie intake was concerned.

TABLE- 63:

MEAN CALORIE INTAKE PER DAY IN RELATION TO TYPE OF FAMILY

Physiological Status	Type of Family	Calorie intake (Kcal) / Day	
		Range	Mean $\pm$ S.D.
Pre-pregnant	*Joint (N = 363)*	*1297 – 2478*	*1860.95 $\pm$ 184.67*
	Nuclear (N = 37)	*1397 – 2119*	*1811.51 $\pm$ 191.59*
	Total (N = 400)	***1297 – 2478***	***1856.38 $\pm$ 185.63***
Pregnant	*Joint (N = 333)*	*1062 – 2575*	*1807.93 $\pm$ 282.02*
	Nuclear (N = 67)	*1254 – 2225*	*1767.98 $\pm$ 267.78*
	Total (N = 400)	***1062 – 2575***	***1801.24 $\pm$ 279.75***
Lactating	*Joint (N = 288)*	*1320 – 3057*	*2389.95 $\pm$ 394.81*
	Nuclear(N = 112)	*1184 – 3029*	*2307.93 $\pm$ 415.89*
	Total (N = 400)	***1184 – 3057***	***2366.99 $\pm$ 401.99***
Non-pregnant Non-lactating	*Joint (N = 197)*	*1125 – 2402*	*1855.01 $\pm$ 241.30*
	Nuclear(N = 203)	*1143 – 2303*	*1832.69 $\pm$ 202.90*
	Total (N = 400)	***1125 – 2402***	***1843.68 $\pm$ 222.64***
Overall	**Joint (N = 1181)**	**1062 – 3057**	**1974.01 $\pm$ 369.77**
	Nuclear(N = 419)	**1143 – 3029**	**1947.51 $\pm$ 358.22**
	Total (N = 1600)	**1062 – 3057**	**1967.07 $\pm$ 366.85**

p = .000 (Sig.)

The above table reveals that there was not much difference in the mean calorie intake of women with respect to type of family i.e. women from joint families had mean intake of 1974.01 $\pm$ 36.77 Kcals compared to 1947.51 $\pm$ 358.22 Kcals in nuclear families. Similarly there was not much difference in calorie intake among women in joint and nuclear families belonging to all physiological groups which had almost same mean calorie intake.

TABLE- 64:
PERCENTAGE OF WOMEN WITH DIFFERENT CALORIE INTAKE PER DAY WITH RESPECT TO OCCUPATION

Physiological Status	Occupation	Calorie Intake / day: Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age	p value	Result
Pre-pregnant	Housewives	67	40.4	99	59.6	166	100.0	.000	Sig
	Un-Skilled	12	8.6	127	91.4	139	100.0		
	Semi-Skilled	4	10.8	33	89.2	37	100.0		
	Skilled	16	33.3	32	66.7	48	100.0		
	Professional	3	30.0	7	70.0	10	100.0		
	Total	**102**	**25.5**	**298**	**74.5**	**400**	100.0		
Pregnant	Housewives	16	9.4	154	90.6	170	100.0	.000	Sig.
	Un-Skilled	–	–	145	100.0	145	100.0		
	Semi-Skilled	–	–	21	100.0	21	100.0		
	Skilled	6	12.0	44	88.0	50	100.0		
	Professional	2	14.3	12	85.7	14	100.0		
	Total	**24**	**6.0**	**376**	**94.0**	**400**	100.0		
Lactating	Housewives	56	32.0	119	68.0	175	100.0	.000	Sig.
	Un-Skilled	61	38.6	97	61.4	158	100.0		
	Semi-Skilled	1	12.5	7	87.5	8	100.0		
	Skilled	3	7.0	40	93.0	43	100.0		
	Professional	6	37.5	10	62.5	16	100.0		
	Total	**127**	**31.8**	**273**	**68.2**	**400**	100.0		
Non-pregnant Non-lactating	Housewives	86	46.5	99	53.5	185	100.0	.202	Insig.
	Un-Skilled	5	4.7	102	95.3	107	100.0		
	Semi-Skilled	2	5.9	32	94.1	34	100.0		
	Skilled	9	15.8	48	84.2	57	100.0		
	Professional	5	29.4	12	70.6	17	100.0		
	Total	**107**	**26.8**	**293**	**73.2**	**400**	100.0		
Overall	**Housewives**	**225**	**32.3**	**471**	**67.7**	**696**	100.0	**.000**	**Sig.**
	Un-Skilled	**78**	**14.2**	**471**	**85.8**	**549**	100.0		
	Semi-Skilled	**7**	**7.0**	**93**	**93.0**	**100**	100.0		
	Skilled	**34**	**17.2**	**164**	**82.8**	**198**	100.0		
	Professional	**16**	**28.1**	**41**	**71.9**	**57**	100.0		
	Total	**360**	**22.5**	**1240**	**77.5**	**1600**	100.0		

The above table depicts calorie intake by occupation of mothers and it can be seen that overall percentage of women with normal calorie intake was highest among housewives 32.3% followed by professional 28.1%.

The percentage of women with normal calorie intake was highest among housewives with Non-pregnant non-lactating women ranking at number one position (46.5%) followed by Pre-pregnant (40.4%) housewives, lactating 32.8% and lastly pregnant women (9.4%).

Incase of Pre-pregnant women the highest percentages of women with normal calorie intake were housewives (40.4%) followed by skilled women (33.3%) and professionals (30.0%) respectively.

As far as pregnant category was concerned professional women had an edge (14.3%) over skilled (12.0%) and housewives (9.4%) respectively as far as their normal calorie intake was concerned.

Incase of lactating women again professional women ranked at number one position (37.5%) as far as normal calorie intake was concerned, they were followed by un-skilled (38.6%) and housewives (32.0%) of same group.

Percentage of women with normal calorie intake was highest among Non-pregnant non-lactating housewives (46.5%) followed by professional women of same group (29.4%) and skilled women (15.8%) respectively.

TABLE- 65:

MEAN CALORIE INTAKE OF WOMEN WITH RELATION TO OCCUPATION

Physiological Status	Type of Family	Calorie Intake (Kcal) / Day Range	Mean ± S.D.	p value	Result
	Housewives	*1377 – 2213*	*1843 .24 ± 162.45*		
	Un-Skilled	*1297 – 2396*	*1880.42 ± 196.37*		
Pre-pregnant	*Semi-Skilled*	*1542 – 2478*	*1890.60 ± 252.44*	*.113*	*Insig.*
	Skilled	*1317 – 2206*	*1811.06 ± 168.27*		
	Professional	*1704 – 2186*	*1831.28 ± 145.64*		
	Total	***1297 – 2478***	***1856.38 ± 185.63***		
	Housewives	*1211 – 2575*	*1869.40 ± 260.90*		
	Un-Skilled	*1062 – 2221*	*1695.85 ± 272.33*		
Pregnant	*Semi-Skilled*	*1384 – 2076*	*1590.21 ± 223.95*	*.000*	*Sig.*
	Skilled	*1184 – 2273*	*1938.15 ± 227.55*		
	Professional	*1414 – 2284*	*1892.55 ± 292.71*		
	Total	***1062 – 2575***	***1801.24 ± 279.75***		
	Housewives	*1184 – 3057*	*2209.29 ± 407.63*		
	Un-Skilled	*1904 – 3029*	*2629.62 ± 267.02*		
Lactating	*Semi-Skilled*	*1570 – 2496*	*2124.16 ± 369.19*	*.000*	*Sig.*
	Skilled	*1320 – 2659*	*2123.02 ± 248.50*		
	Professional	*1596 – 2782*	*2275.30 ± 400.64*		
	Total	***1184 – 3057***	***2366.99 ± 401.99***		
	Housewives	*1295 – 2334*	*1824.19 ± 235.71*		
	Un-Skilled	*1592 – 2402*	*1942.02 ± 149.17*		
Non-pregnant Non-lactating	*Semi-Skilled*	*1629 – 2264*	*1908.79 ± 158.71*	*.000*	*Sig.*
	Skilled	*1125 – 2022*	*1723.36 ± 215.70*		
	Professional	*1143 – 2038*	*1710.05 ± 293.81*		
	Total	***1125 – 2402***	***1843.68 ± 222.64***		
	Housewives	**1184 – 3057**	**1936.61 ± 323.11**		
	Un-Skilled	**1062 – 3029**	**2059.30 ± 439.85**		
Overall	**Semi-Skilled**	**1384 – 2496**	**1852.39 ± 271.16**	**.000**	**Sig.**
	Skilled	**1125 – 2659**	**1885.66 ± 260.77**		
	Professional	**1143 – 2782**	**1934.81 ± 376.53**		
	Total	**1062 – 3057**	**1967.07 ± 366.85**		

Overall mean calorie intake per day of sample with relation to occupation showed that un-skilled women had highest mean calorie intake of 2059.30 ± 439.85 Kcals. The mean calorie intake of

housewives and professional women showed slight variations (1936.61 ± 323.11 Kcals and 1934.81 ± 376.53 Kcals) respectively. Skilled women and semi-skilled women also showed slight variation in their mean calorie intake (1885.66 ± 260.77 Kcals and 1852.39 ± 271.16 Kcals) respectively.

There was statistically significant (p = .000) difference between the mean calorie intake of occupational groups of pregnant, lactating and Non-pregnant non-lactating women. However, there was an insignificant difference (p=.113) in mean calorie intake of occupational group of Pre-pregnant women.

TABLE- 66: PERCENTAGE OF WOMEN WITH DIFFERENT CALORIE INTAKE PERDAY WITH RESPECT TO LITERACY STATUS

Physiological Status	Literacy Status	Calorie intake / day: Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age	p value	Result
Pre-pregnant	Illiterate	14	9.9	127	90.1	141	100.0	.000	Sig.
	Literate	88	34.0	171	66.0	259	100.0		
	Total	**102**	**25.5**	**298**	**74.5**	**400**	**100.0**		
Pregnant	Illiterate	–	–	194	100.0	194	100.0	.000	Sig.
	Literate	24	11.7	182	88.3	206	100.0		
	Total	**24**	**6.0**	**376**	**94.0**	**400**	**100.0**		
Lactating	Illiterate	43	20.7	165	79.3	208	100.0	.000	Sig.
	Literate	84	43.7	108	56.3	192	100.0		
	Total	**127**	**31.8**	**273**	**68.2**	**400**	**100.0**		
Non-pregnant Non-lactating	Illiterate	42	23.6	136	76.4	178	100.0	.202	Insig.
	Literate	65	29.3	157	70.7	222	100.0		
	Total	**107**	**26.8**	**293**	**73.2**	**400**	**100.0**		
Overall	Illiterate	140	19.8	565	80.2	705	100.0	.025	Sig.
	Literate	220	24.6	675	75.4	895	100.0		
	Total	360	22.5	1240	77.5	1600	100.0		

The above data depicts that in the overall group the literate women have edge over illiterate ladies as far as caloric intake per day is concerned i.e. percentage of literate women with normal calorie intake is higher 24.6% in comparison to illiterate women 19.8%.

Same stands true for women in all physiological groups.

TABLE- 67:
MEAN CALORIE INTAKE PER DAY OF WOMEN WITH RESPECT TO LITERACY STATUS

Physiological Status	Literacy Status	Calorie Intake (Kcal)/ Day Range	Mean ± S.D.	p value	Result
Pre-pregnant	Illiterate	1317 – 2478	1852.77 ± 177.54	.389	Insig.
	Literate	1297 – 2396	1863.01 ± 200.12		
	Total	1297 – 2478	1856.38 ± 185.63		
Pregnant	Illiterate	1062 – 2134	1692.29 ± 255.97	.000	Sig.
	Literate	1184 – 2575	1903.84 ± 262.35		
	Total	1062 – 2575	1801.24 ± 279.75		
Lactating	Illiterate	1184 – 3057	2167.54 ± 375.81	.000	Sig.
	Literate	1712 – 3029	2583.05 ± 307.02		
	Total	1184 – 3057	2366.99 ± 401.99		
Non-pregnant Non-lactating	Illiterate	1125 – 2303	1762.15 ± 235.75	.202	Insig.
	Literate	1592 – 2402	1945.37 ± 153.63		
	Total	1125 – 2402	1843.68 ± 222.64		
Overall	Illiterate	1125 – 3057	1915.20 ± 305.14	.025	Sig.
	Literate	1062 – 3029	2032.92 ± 423.87		
	Total	1062 – 3057	1967.07 ± 366.85		

Overall the mean calorie intake with respect to literacy status shows that literate women had highest mean calorie intake (2032.92 ± 423.84 Kcals) as compared to illiterate women (1915.20 ± 305.14 Kcals). Same trend was followed by Pre-pregnant, pregnant, lactating and Non-pregnant non-lactating mothers as far as their mean calorie intake was concerned.

TABLE- 68: PERCENTAGE OF WOMEN WITH DIFFERENT PROTIEN INTAKE PERDAY WITH RELATION TO AGE OF SAMPLE

Physiological Status	Grouped Age (Years)	Protein intake / day Normal No.	%age	Below Normal No.	%age	Total No.	%age
	≤ 20	31	23.5	101	76.5	132	100.0
Pre-pregnant	21-30	127	52.3	116	47.7	243	100.0
	> 30	21	84.0	4	16.0	25	100.0
	Total	**179**	**44.7**	**221**	**55.3**	**400**	**100.0**
	≤ 20	–	–	84	100.0	84	100.0
Pregnant	21-30	21	7.5	258	92.5	279	100.0
	> 30	2	5.4	35	94.6	37	100.0
	Total	**23**	**5.8**	**377**	**94.2**	**400**	**100.0**
	≤ 20	–		16	100.0	16	100.0
Lactating	21-30	35	13.0	235	87.0	270	100.0
	> 30	24	21.1	90	78.9	114	100.0
	Total	**59**	**14.8**	**341**	**85.2**	**400**	**100.0**
	≤ 20	–		2	100.0	2	100.0
Non-pregnant Non-lactating	21-30	39	39.8	59	60.2	98	100.0
	> 30	79	26.3	221	73.7	300	100.0
	Total	**118**	**29.5**	**282**	**70.5**	**400**	**100.0**
	≤ 20	**31**	**13.2**	**203**	**86.8**	**234**	**100.0**
Overall	**21-30**	**222**	**24.9**	**668**	**75.1**	**890**	**100.0**
	> 30	**126**	**26.5**	**350**	**73.5**	**476**	**100.0**
	Total	**379**	**23.7**	**1221**	**76.3**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 50.877, p = .000 (Sig.)

Studying the effect of age in relation to protein intake shows that in overall group the percentage of women whose protein intake was below normal were in the age group of below 20 years or 20 years old (86.8%). However there was not much difference in the percentage of women with below normal protein intake in the age group of 21-30 years (75.1%) and in women above 30 years of age (73.5%).

The percentage of women with below normal protein intake was highest among pregnant, lactating, Non-pregnant non-lactating women in the age group 20 years and below (100.0%).Same was true for Pre-pregnant women belonging to the same age group (76.5%).

TABLE- 69:

MEAN PROTIEN INTAKE PERDAY OF WOMEN WITH RELATION TO AGE

Physiological Status	Grouped Age (Years)	Protein intake (gms) / day Range	Mean ± S.D.	p value	Result
	≤ 20 (n = 132)	28 – 59	43.85 ± 6.57		
Pre-pregnant	21-30 (n = 243)	31 – 69	51.77 ± 8.87		
	> 30 (n = 25)	48 – 64	57.11 ± 5.08	.000	Sig.
	Total (n = 400)	**28 – 69**	**49.49 ± 8.98**		
	≤ 20 (n = 84)	27 – 61	38.15 ± 8.04		
Pregnant	21-30 (n = 279)	27 – 85	46.77 ± 11.89	.000	Sig.
	> 30 (n = 37)	37 – 69	55.04 ± 8.09		
	Total (n = 400)	**27 – 85**	**45.72 ± 11.78**		
	≤ 20 (n = 16)	33 – 73	59.93 ± 10.84		
Lactating	21-30 (n = 270)	33 – 95	63.97 ± 10.72	.358	Insig.
	> 30 (n = 114)	33 – 96	64.34 ± 12.94		
	Total (n = 400)	**33 – 96**	**63.91 ± 11.40**		
	≤ 20 (n = 2)	36 – 36	35.95 ± 0.0		
	21-30 (n = 98)	33 – 65	48.58 ± 8.30	.000	Sig.
Non-pregnant Non-lactating	> 30 (n = 300)	27 – 71	44.09 ± 8.44		
	Total (n = 400)	**27 – 71**	**45.15 ± 8.62**		
	≤ 20 (n = 234)	**27 – 73**	**42.84 ± 9.61**		
Overall	**21-30 (n = 890)**	**27 – 95**	**53.55 ± 12.61**	**.000**	**Sig.**
	> 30 (n = 476)	**27 – 96**	**50.48 ± 12.91**		
	Total (n = 1600)	**27 – 96**	**51.07 ± 12.79**		

< or = 20 years age p = .000 (Sig), 21 – 30 years age p = .000 (Sig) > 30 years age p .000 (Sig)

The protein intake with respect to different age group shows that overall mothers in the age group of 21-30 years had highest protein intake of 53.55 ± 12.61 grams followed by those who were above 30 years of age (50.48 ± 12.91 grams). However women who were 20 years or below of age had lowest protein intake (42.84 ± 9.61 grams).

Incase of Pre-pregnant women increase in age showed increase in protein intake i.e. women above 30 years of age had highest protein intake of 57.11 ± 5.08 grams, followed by those in the age group of 21-30 years (51.77 ± 8.87 grams) and least of all those who were 20 years old or more (43.85 ± 6.57 grams).

Same trend was held by pregnant and lactating mothers with protein intake increasing with increasing age. The only exception to this trend was Non-pregnant non-lactating women with those in the

age group of 21-30 years having highest protein intake (48.58 ± 8.3 grams), followed by those above 30 years of age (44.09 ± 8.44 grams) and lastly those who were below 20 years or 20 years of age.

TABLE- 70: PERCENTAGE OF WOMEN WITH DIFFERENT PROTIEN INTAKE PERDAY IN RELATION TO SOCIO-ECONOMIC STATUS

Physiological Status	Socio-economic Status	Protein consumption per day: Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age
	Low	7	14.3	42	85.7	49	100.0
	Lower-middle	20	21.1	75	78.9	95	100.0
Pre-pregnant	Upper- Middle	32	50.0	32	50.0	64	100.0
	High	120	62.5	72	37.5	192	100.0
	Total	**179**	**44.8**	**221**	**55.2**	**400**	**100.0**
Pregnant	Low	–	–	55	100.0	55	100.0
	Lower-middle	2	1.9	101	98.1	103	100.0
	Upper- Middle	–	–	50	100.0	50	100.0
	High	21	10.9	171	89.1	192	100.0
	Total	**23**	**5.8**	**377**	**94.2**	**400**	**100.0**
	Low	2	2.9	66	97.1	68	100.0
	Lower-middle	2	3.7	52	96.3	54	100.0
Lactating	Upper- Middle	3	4.4	65	95.6	68	100.0
	High	52	24.8	158	75.2	210	100.0
	Total	**59**	**14.8**	**341**	**85.2**	**400**	**100.0**

Physiological Status	Socio-economic Status	Protein consumption per day: Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age
	Low	2	4.2	46	95.8	48	100.0
	Lower-middle	5	7.0	66	93.0	71	100.0
Non-pregnant Non-lactating	Upper- Middle	7	8.7	73	91.3	80	100.0
	High	104	51.7	97	48.3	201	100.0
	Total	**118**	**29.5**	**282**	**70.5**	**400**	**100.0**
	Low	**11**	**5.0**	**209**	**95.0**	**220**	**100.0**
	Lower-middle	**29**	**9.0**	**294**	**91.0**	**323**	**100.0**
Overall	**Upper- Middle**	**42**	**16.0**	**220**	**84.0**	**262**	**100.0**
	High	**297**	**37.4**	**498**	**62.6**	**795**	**100.0**
	Total	**379**	**23.7**	**1221**	**76.3**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 171.856, p =.000 (Sig.)

It can be observed from the above table that higher percentage of women with normal protein intake belonged to high SES in all categories. With increase in SES there was constant increase in percentage of mothers consuming normal content of proteins. While 37.4% of women belonging to high SES in overall category had normal protein intake the percentage for Pre-pregnant category was 62.5% and this percentage dropped down to 10.9% incase of pregnant status, 24.8% in lactating group and 51.7% in Non-pregnant non-lactating women.

TABLE- 71: PROTIEN INTAKE PERDAY OF WOMEN WITH RESPECT TO SOCIO-ECONOMIC STATUS

Physiological Status	Socio-economic Status	Protein Intake (gms) / day Range	Mean ± S.D.	p value	Result
Pre-pregnant	*Low (n = 49)*	*33 – 56*	*43.59 ± 5.12*	.001	Sig.
	Lower-middle(n=95)	*35 – 64*	*45.00 ± 7.10*		
	Upper-middle(n=64)	*28 – 67*	*47.97 ± 9.41*		
	High (n = 192)	*31 – 69*	*53.72 ± 8.38*		
	Total (n = 400)	***31 – 69***	***49.49 ± 8.98***		
Pregnant	*Low (n = 55)*	*27 – 57*	*36.61 ± 7.02*	.000	Sig.
	Lower-middle(n=103)	*27 – 67*	*37.88 ± 7.93*		
	Upper-middle(n=50)	*29 – 60*	*45.48 ± 9.08*		
	High (n = 192)	*27 – 85*	*52.60 ± 10.79*		
	Total (n = 400)	***27 – 85***	***45.72 ± 11.78***		
Lactating	*Low (n = 68)*	*33 – 75*	*58.38 ± 10.36*	.000	Sig.
	Lower-middle(n=54)	*42 – 75*	*59.04 ± 9.55*		
	Upper-middle(n=68)	*33 – 84*	*65.88 ± 9.06*		
	High (n = 210)	*33 – 96*	*66.32 ± 11.88*		
	Total (n = 400)	***33 – 96***	***63.91 ± 11.40***		
Non-pregnant Non-lactating	*Low (n = 48)*	*31 – 52*	*41.21 ± 5.64*	.000	Sig.
	Lower-middle(n=71)	*31 – 60*	*41.52 ± 6.21*		
	Upper-middle(n=80)	*29 – 54*	*41.96 ± 5.78*		
	High (n = 201)	*27 – 71*	*48.65 ± 9.44*		
	Total (n = 400)	***27 – 71***	***45.15 ± 8.62***		
Overall	**Low (n = 220)**	**27 – 75**	**45.90 ± 11.56**		
	Lower-middle(n=323)	**27 – 75**	**44.31 ± 10.46**		
	Upper-middle(n=262)	**28 – 84**	**50.31 ± 12.59**		
	High (n = 795)	**27 – 96**	**55.50 ± 12.25**		
	Total (n = 1600)	**27 – 96**	**51.07 ± 12.79**		

The above table reveals that there was a significant difference between the protein intake of women belonging to all physiological groups. The table further depicts that women with high SES had highest protein intake in all categories and women with low SES had lowest mean protein intake.

TABLE- 72: PERCENTAGE OF WOMEN WITH DIFFERENT PROTIEN INTAKE PERDAY IN RELATION OF TYPE OF FAMILY

Physiological Status	Type of Family	Protein consumption / day Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age	x^2	p value	Result
Pre-pregnant	Joint	160	44.1	203	55.9	363	100.0	0.719	.397	Insig.
	Nuclear	19	51.4	18	48.6	37	100.0			
	Total	179	44.8	221	55.2	400	100.0			
Pregnant	Joint	15	4.5	318	95.5	333	100.0	5.691	.017	Sig.
	Nuclear	8	11.9	59	88.1	67	100.0			
	Total	23	5.8	377	94.2	400	100.0			
Lactating	Joint	45	15.6	243	84.4	288	100.0	0.629	.000	Sig.
	Nuclear	14	12.5	98	87.5	112	100.0			
	Total	59	14.8	341	85.2	400	100.0			
Non-pregnant Non-lactating	Joint	59	29.9	138	70.1	197	100.0	0.038	.000	Sig.
	Nuclear	59	29.1	144	70.9	203	100.0			
	Total	118	29.5	282	70.5	400	100.0			
Overall	**Joint**	**279**	**23.6**	**902**	**76.4**	**1181**	**100.0**	**0.257**	**.920**	**Insig.**
	Nuclear	**100**	**23.9**	**319**	**76.1**	**419**	**100.0**			
	Total	**379**	**23.7**	**1221**	**76.3**	**1600**	**100.0**			

While analyzing protein intake in relation to type of family it was seen that in overall group the percentage of women whose protein intake was normal was almost similar between women living in nuclear and joint families (23.9% and 23.6% respectively).

Difference in the percentage of normal protein intake was observed in Pre-pregnant group with respect to type of family i.e. (44.1% for women living in joint families compared to 51.4% women living in nuclear families). In pregnant group it was 4.5% incase of

women living in joint families and 11.9% for women living in nuclear families. As far as lactating women were concerned the percentage of women whose protein intake was normal was 15.6% for those who were part of joint families and 12.5% for women who lived in nuclear families. The percentage of women in Non-pregnant non-lactating group whose protein intake was normal was almost same in both types of families i.e. 29.9% in joint families and 29.1% for those in nuclear families.

TABLE- 73: MEAN PROTIEN INTAKE PERDAY OF WOMEN WITH RESPECT TO TYPE OF FAMILY

Physiological Status	Type of Family	Protein intake (gms) / day	
		Range	Mean ± S.D.
Pre-pregnant	*Joint (n = 363)*	*28 – 69*	*49.34 ± 9.24*
	Nuclear (n = 37)	*39 – 66*	*50.96 ± 5.73*
	Total (n = 400)	***28 – 69***	***49.49 ± 8.98***
Pregnant	*Joint (n = 333)*	*27 – 85*	*45.94 ± 11.70*
	Nuclear (n = 67)	*27 – 69*	*44.63 ± 12.20*
	Total (n = 400)	***27 – 85***	***45.72 ± 11.78***
Lactating	*Joint (n = 288)*	*33 – 96*	*64.07 ± 11.60*
	Nuclear (n = 112)	*33 – 95*	*63.50 ± 10.92*
	Total (n = 400)	***33 – 96***	***63.91 ± 11.40***
Non-pregnant Non-lactating	*Joint (n = 197)*	*27 – 71*	*45.01 ± 9.51*
	Nuclear (n = 203)	*27 – 61*	*45.29 ± 7.68*
	Total (n = 400)	***27 – 71***	***45.15 ± 8.62***
Overall	**Joint (n = 1181)**	**27 – 96**	**51.25 ± 12.97**
	Nuclear (n = 419)	**27 – 95**	**50.55 ± 12.27**
	Total (n = 1600)	**27 – 96**	**51.07 ± 12.79**

p = .000 (Sig)

The table depicts that there was negligible difference in the mean 24 hour protein intake among women with respect to type of family belonging to various physiological groups.

TABLE- 74:PERCENTAGE OF WOMEN WITH DIFFERENT PROTIEN INTAKE PERDAY IN RELATION TO OCCUPATION

Physiological Status	Occupation	Protein intake / day Normal No.	%age	Below Normal No.	%age	Total No.	%age	p value	Result
	Housewives	102	61.4	64	38.6	166	100.0		
	Un-Skilled	33	23.7	106	76.3	139	100.0		
Pre-pregnant	Semi-Skilled	5	13.5	32	86.5	37	100.0	.000	Sig.
	Skilled	32	66.6	16	33.4	48	100.0		
	Professional	7	70.0	3	30.0	10	100.0		
	Total	**179**	**44.7**	**221**	**55.3**	**400**	**100.0**		
	Housewives	11	6.4	159	93.6	170	100.0		
	Un-Skilled	2	1.3	143	98.7	145	100.0		
Pregnant	Semi-Skilled	–	–	21	100.0	21	100.0	.000	Sig.
	Skilled	6	12.0	44	88.0	50	100.0		
	Professional	4	28.5	10	71.5	14	100.0		
	Total	**23**	**5.7**	**377**	**94.3**	**400**	**100.0**		
	Housewives	33	18.6	142	81.4	175	100.0		
	Un-Skilled	9	5.6	149	94.4	158	100.0		
Lactating	Semi-Skilled	2	25.0	6	75.0	8	100.0		
	Skilled	4	9.3	39	90.7	43	100.0	.000	Sig.
	Professional	11	68.7	5	31.3	16	100.0		
	Total	**59**	**14.8**	**341**	**85.2**	**400**	**100.0**		
	Housewives	78	42.1	107	57.9	185	100.0		
	Un-Skilled	3	2.8	104	97.2	107	100.0		
Non-pregnant	Semi-Skilled	2	5.8	32	94.2	34	100.0	.000	Sig.
Non-lactating	Skilled	30	52.6	27	47.4	57	100.0		
	Professional	5	29.4	12	70.6	17	100.0		
	Total	**118**	**29.5**	**282**	**70.5**	**400**	**100.0**		
	Housewives	**224**	**32.2**	**472**	**67.8**	**696**	**100.0**		
	Un-Skilled	**47**	**8.5**	**502**	**91.5**	**549**	**100.0**		
Overall	**Semi-Skilled**	**9**	**9.0**	**91**	**91.0**	**100**	**100.0**	**.000**	**Sig.**
	Skilled	**72**	**36.3**	**126**	**63.7**	**198**	**100.0**		
	Professional	**27**	**47.3**	**30**	**52.7**	**57**	**100.0**		
	Total	**379**	**23.7**	**1221**	**76.3**	**1600**	**100.0**		

Pearson Chi – Square (x^2) = *144.504*

It can be inferred from the data that overall the percentage of women with normal protein intake was highest among (47.3%) professional group, followed by skilled (36.3%), housewives (32.2%) semiskilled (9.0%) and unskilled women (8.5%) respectively.

The protein intake showed similar pattern in different occupational groups during Pre-pregnant and pregnant state also. However, among lactating mothers the percentage of women with normal protein intake was highest among professional group (68.7%) followed by semiskilled women (25.0%), housewives (18.6%), skilled (9.3%) and unskilled women (5.6%) respectively. As far as Non-pregnant non-lactating women were concerned the percentage of women with normal protein intake was highest among skilled women (52.6%), followed by housewives (42.1%), professionals (29.4%), semiskilled (5.8%) and unskilled women (2.8%) respectively. These differences were statistically significant (p = .000).

TABLE- 75: MEAN PROTIEN INTAKE PERDAY OF WOMEN WITH RESPECT TO OCCUPATION

Physiological Status	Occupation	Protein intake (gms) / day Range	Mean ± S.D.	p value	Result
	Housewives (n=166)	*28 – 69*	*52.70 ± 8.69*		
	Un-Skilled (n=139)	*35 – 66*	*45.20 ± 6.63*		
Pre-pregnant	*Semi-Skilled (n=37)*	*33 – 59*	*42.75 ± 6.70*		
	Skilled (n=48)	*31 – 69*	*54.47 ± 9.16*	*.000*	*Sig.*
	Professional (n=10)	*47 – 64*	*56.88 ± 7.04*		
	Total (n=400)	***28 – 69***	***49.49 ± 8.98***		
	Housewives (n=170)	*31 – 70*	*49.50 ± 10.74*		
	Un-Skilled (n=145)	*27 – 67*	*38.66 ± 8.90*		
Pregnant	*Semi-Skilled (n=21)*	*30 – 58*	*35.37 ± 7.66*		
	Skilled (n=50)	*38 – 85*	*54.74 ± 8.94*	*.000*	*Sig.*
	Professional (n=14)	*36 – 70*	*56.22 ± 11.98*		
	Total (n=400)	***27 – 85***	***45.72 ± 11.78***		
	Housewives (n=175)	*33 – 95*	*64.81 ± 11.48*		
	Un-Skilled (n=158)	*33 – 96*	*61.47 ± 10.92*		
Lactating	*Semi-Skilled (n=87)*	*39 – 91*	*62.96 ± 20.51*		
	Skilled (n=43)	*50 – 95*	*66.43 ± 8.56*	*.000*	*Sig.*
	Professional (n=16)	*51 – 80*	*71.88 ± 11.07*		
	Total (n=400)	***33 – 96***	***63.91 ± 11.40***		
	Housewives (n=185)	*27 – 71*	*46.93 ± 9.24*		
	Un-Skilled (n=107)	*31 – 52*	*41.24 ± 5.44*		
Non-pregnant Non-lactating	*Semi-Skilled (n=34)*	*31 – 52*	*42.33 ± 5.11*		
	Skilled (n=57)	*27 – 65*	*49.39 ± 9.32*	*.001*	*Sig.*
	Professional (n=17)	*27 – 54*	*41.81 ± 9.18*		
	Total (n=400)	***27 – 71***	***45.15 ± 8.62***		
	Housewives (n=696)	**27 – 95**	**53.43 ± 12.22**		
	Un-Skilled (n=549)	**27 – 96**	**47.38 ± 12.56**		
Overall	**Semi-Skilled (n=100)**	**30 – 91**	**42.68 ± 10.55**		
	Skilled (n=198)	**27 – 95**	**55.67 ± 10.84**	**.000**	**Sig.**
	Professional (n=57)	**27 – 80**	**56.43 ± 15.21**		
	Total (n=1600)	**27 – 96**	**51.07 ± 12.79**		

The above table shows that mean dietary protein intake with respect to occupation showed that overall professional ladies had highest mean protein intake (56.43 ± 15.21 grams) followed by skilled women (55.67 ± 10.84 grams), housewives (53.43 ± 12.22 grams)

unskilled (47.38 ± 12.56 grams) and semiskilled women (42.63 ± 10.55 grams) respectively.

Same was true for Pre-pregnant and pregnant women. The data from lactating group of women followed similar trend with the exception that semiskilled group interchanged its position with semiskilled group.

However Non-pregnant non-lactating group gave a different picture with skilled group having the highest mean protein intake (49.39 ± 9.32 grams) followed by housewives (46.93 ± 9.24 grams) and semiskilled group (42.33 ± 5.11 grams) respectively. However mean protein intake of professional Non-pregnant non-lactating and unskilled Non-pregnant non-lactating women was almost same (41.81 ± 9.18 grams and 41.24 ± 5.44 grams respectively).

TABLE- 76: PERCENTAGE OF WOMEN WITH DIFFERENT PROTIEN INTAKE PERDAY WITH RELATION TO LITERACY STATUS

Physiological Status	Literacy Status	Protein intake / day: Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age	p value	Result
	Illiterate	*25*	*17.7*	*116*	*82.3*	*141*	*100.0*		
Pre-pregnant	*Literate*	*154*	*59.4*	*105*	*40.6*	*259*	*100.0*	*.000*	*Sig.*
	Total	***179***	***44.7***	***221***	***55.3***	***400***	***100.0***		
	Illiterate	*2*	*1.1*	*192*	*98.9*	*194*	*100.0*		
Pregnant	*Literate*	*21*	*10.2*	*185*	*89.8*	*206*	*100.0*	*.000*	*Sig.*
	Total	***23***	***5.7***	***377***	***94.3***	***400***	***100.0***		
	Illiterate	*9*	*4.7*	*183*	*95.3*	*192*	*100.0*		
Lactating	*Literate*	*50*	*24.0*	*158*	*76.0*	*208*	*100.0*	*.000*	*Sig.*
	Total	***59***	***14.8***	***341***	***85.2***	***400***	***100.0***		
	Illiterate	*13*	*7.3*	*165*	*92.7*	*178*	*100.0*		
Non-pregnant Non-lactating	*Literate*	*105*	*47.3*	*117*	*52.7*	*222*	*100.0*	*.000*	*Sig.*
	Total	***118***	***29.5***	***282***	***70.5***	***400***	***100.0***		
	Illiterate	**49**	**6.9**	**656**	**93.1**	**705**	**100.0**		
Overall	**Literate**	**330**	**36.8**	**565**	**63.2**	**895**	**100.0**	**.000**	**Sig.**
	Total	**379**	**23.7**	**1221**	**76.3**	**1600**	**100.0**		

The table shows that overall 36.8% literate ladies had normal protein intake as compared to 6.9% illiterate women. In Pre-pregnant category it was 59.4% among literate group as compared to 17.7% in illiterate group. Same was true fro pregnant group i.e. 10.2% in literate women as compared to 1.1% illiterate women. In lactating women it was 24.0% for literate group as compared to 4.7% among illiterate women. As far as Non-pregnant non-lactating group was concerned this percentage was 47.3% for literate women as compared to 7.3% for illiterate mothers.

Thus protein intake among literate mothers in all physiological states shows an edge over illiterate women and the differences were statistically significant (p = .000).

TABLE- 77: MEAN PROTIEN INTAKE PERDAY OF WOMEN WITH RESPECT TO LITERACY STATUS

Physiological Status	Literacy Status	Protein intake (gms) / day Range	Mean ± S.D.	p value	Result
Pre-Pregnant	*Illiterate (n = 141)*	*28 – 57*	*43.42 ± 5.94*	.000	Sig.
	Literate (n = 259)	*31 – 69*	*52.79 ± 8.64*		
	Total (n = 400)	***28 – 69***	***49.49 ± 8.98***		
Pregnant	*Illiterate (n = 194)*	*27 – 67*	*38.07 ± 7.79*	.000	Sig.
	Literate (n = 206)	*27 – 85*	*52.93 ± 10.26*		
	Total (n = 400)	***27 – 85***	***45.72 ± 11.78***		
Lactating	*Illiterate (n = 192)*	*33 – 96*	*61.40 ± 10.69*	.000	Sig.
	Literate (n = 208)	*39 – 95*	*66.23 ± 11.57*		
	Total (n = 400)	***33 – 96***	***63.91 ± 11.40***		
Non-Pregnant Non-Lactating	*Illiterate (n = 178)*	*31 – 71*	*42.19 ± 6.70*	.000	Sig.
	Literate (n = 222)	*27 – 65*	*47.53 ± 9.24*		
	Total (n = 400)	***27 – 71***	***45.15 ± 8.62***		
Overall	**Illiterate (n = 705)**	**27 – 96**	**46.53 ± 12.36**	**.000**	**Sig.**
	Literate (n = 895)	**27 – 95**	**54.64 ± 11.97**		
	Total (n = 1600)	**27 – 96**	**51.07 ±12.79**		

Mean protein intake of literate women in all categories was more as compared to illiterate women i.e. overall mean protein intake of literate women was 54.64 ± 11.97 grams as compared to 46.53 ± 12.36 grams among illiterate women. Similarly 52.79 ± 8.64 grams

of mean protein intake per day for literate pre-pregnant group as compared to 43.42 ± 5.94 grams illiterate pre-pregnant women, among literate pregnant women it was 52.93 ± 10.26 grams as compared to 38.07 ± 7.79 grams among illiterate women, among lactating mothers it was 66.23 ± 11.57 grams for literate compared to 61.40 ± 10.69 grams illiterate lactating mothers. The mean protein intake of non-pregnant non-lactating literate women was 47.53 ± 9.42 grams as compared to 42.19 ± 6.70 grams in illiterate non-pregnant non-lactating women. These differences between mean protein intake of literate and illiterate women were statistically significant (p = .000).

TABLE- 78: PERCENTAGE OF WOMEN WITH DIFFERENT IRON INTAKE WITH RELATION TO AGE OF SAMPLE

Physiological Status	Grouped Age (Years)	Dietary Iron Intake / Day: Normal No.	Normal %age	Below Normal No.	Below Normal %age	Total No.	Total %age
Pre-Pregnant	≤ 20	–	–	132	100.0	132	100.0
	21 – 30	–	–	243	100.0	243	100.0
	> 30	–	–	25	100.0	25	100.0
	Total	–	–	**400**	**100.0**	**400**	**100.0**
Pregnant	≤ 20	–	–	84	100.0	84	100.0
	21 – 30	–	–	279	100.0	279	100.0
	> 30	–	–	37	100.0	37	100.0
	Total	–	–	**400**	**100.0**	**400**	**100.0**
Lactating	≤ 20	1	6.3	15	93.7	16	100.0
	21 – 30	39	14.4	231	85.6	270	100.0
	> 30	9	7.9	105	92.1	114	100.0
	Total	**49**	**12.3**	**351**	**87.7**	**400**	**100.0**
Non-Pregnant Non-Lactating	≤ 20	–	–	2	100.0	2	100.0
	21 – 30	–	–	98	100.0	98	100.0
	> 30	–	–	300	100.0	300	100.0
	Total	–	–	**400**	**100.0**	**400**	**100.0**
Overall	**≤ 20**	**1**	**0.4**	**233**	**99.6**	**234**	**100.0**
	21 – 30	**39**	**4.4**	**851**	**95.6**	**890**	**100.0**
	> 30	**9**	**2.0**	**437**	**98.0**	**446**	**100.0**
	Total	**49**	**3.1**	**1551**	**96.9**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 18.121, p .003 (Insig.)

Dietary iron intake per day in relation to age showed that in general only 3.1% women had normal iron intake in all ages. This percentage was highest (4.4%) in women who were 21-30 years of age followed by women in the age group 21-30 years (2.0%) and lastly by those who were 20 yeas old or less (0.4%). However, these differences were statistically insignificant (p = .003).

As far as pre-pregnant, pregnant and non-pregnant non-lactating women were concerned they did not show any relationship with age and dietary iron intake per day. The only exception to this was women of lactating category where age influenced percentage of women with normal dietary iron intake per day. It was observed that 14.4% lactating women in the age group 21-30 years had normal dietary iron intake per day, they were followed by women who were > 30 years of age (7.9%) and lastly those who were 20 years or less in age (6.3%).

TABLE- 79 : MEAN DIETARY IRON INTAKE PER DAY OF WOMEN IN RELATION TO AGE

Physiological Status	Grouped Age (years)	Iron Intake (mgs) / day Range	Mean ± S.D.	p value	Result
Pre-Pregnant	≤ 20 (n = 132)	6.25 – 15.23	10.1804 ± 2.1866	.002	Sig.
	21 – 30 (n = 243)	6.69 – 16.78	10.7643 ± 2.1187		
	> 30 (n = 25)	8.98 – 15.52	11.6220 ± 1.9006		
	Total (n = 400)	**6.25 – 16.78**	**10.6252 ± 2.1562**		
Pregnant	≤ 20 (n = 84)	4.12 – 12.42	8.0949 ± 2.4044	.0158	Insig.
	21 – 30 (n = 279)	3.42 – 22.32	8.2751 ± 2.4199		
	> 30 (n = 37)	5.65 – 23.22	9.0111 ± 2.8254		
	Total (n = 400)	**3.42 – 23.22**	**8.3053 ± 2.4615**		
Lactating	≤ 20 (n = 16)	4.80 – 40.29	12.4150 ± 8.6141	.103	Insig.
	21 – 30 (n = 270)	4.84 – 40.58	17.0099 ± 8.8158		
	> 30 (n = 114)	4.84 – 38.70	17.2525 ± 7.8577		
	Total (n = 400)	**4.80 – 40.58**	**16.8952 ± 8.5745**		
Non-Pregnant Non-Lactating	≤ 20 (n = 2)	6.56 – 6.56	6.5600 ± 0.00	.000	Sig.
	21 – 30 (n = 98)	5.71 – 15.53	9.4047 ± 2.3658		
	> 30 (n = 300)	3.92- 15.18	8.2339 ± 2.1414		
	Total (n = 400)	**3.92 – 15.53**	**8.5124 ± 2.2517**		
Overall	**≤ 20 (n = 234)**	**4.12 – 40:29**	**9.5536 ± 3.3397**		
	21 – 30 (n = 890)	**3.42 – 40.58**	**11.7290 ± 6.3438**		
	> 30 (n = 476)	**3.92 – 38.70**	**10.6321 ± 5.7245**		
	Total (n = 1600)	**3.42 – 40.58**	**11.0845 ± 5.8626**		

< or = 20 years p = .000 (Sig.), 21 – 30 years p = .000 (Sig.), > 30 years p = .0003 (Sig.)

The overall mean dietary intake of women was 11.0845 $\pm$ 5.86 mgs / day and it was less (9.5536 $\pm$ 3.3397 mgs) in women who were 20 years of age or less and it increased to 11.7290 $\pm$ 6.3438 mgs in 21 – 30 years. However, it was again 10.63438 $\pm$ 5.7245 mgs / day among women > 30 years. The overall intake was lowest during pregnant state (8.3053 $\pm$ 2.465 mgs) followed by non-pregnant non-lactating state and pre-pregnant (8.5124 $\pm$ 2.2517 mgs), pre-pregnant state (10.6252 $\pm$ 2.1562 mgs). Lactating group had very high intake of 16.8952 $\pm$ 8.5745 mgs. Influence of age could not be seen in pre-pregnant, pregnant or non-pregnant non-lactating state. However, in lactating mothers age influenced iron intake. It was less (12.4150 $\pm$ 8.6141 mgs) in women of $\leq$ 20 years of age in comparison to 21-30 years age group (17.009 $\pm$ 5.5158 mgs / day) and among mothers > 30 years (17.2525 $\pm$ 7.8577 mgs / day).

TABLE- 80: MEAN DIETARY IRON INTAKE PER DAY OF WOMEN WITH RESPECT TO SOCIO-ECONOMIC STATUS

Physiological Status	Socio-economic Status	Iron Intake (mgs) / day Range	Mean ± S.D.	p value	Result
Pre-Pregnant	*Low*	*6.82 – 15.23*	*10.28 ± 2.13*	*.001*	*Sig.*
	Lower-middle	*6.74 – 15.55*	*10.11 ± 2.17*		
	Upper-middle	*6.25 – 14.78*	*10.28 ± 2.08*		
	High	*6.69 – 16.78*	*11.07 ± 10.62*		
	Total	***6.25 – 16.78***	***10.62 ± 2.15***		
Pregnant	*Low*	*4.49 – 12.32*	*7.90 ± 2.13*	*.000*	*Sig.*
	Lower-middle	*3.59 – 13.55*	*7.50 ± 2.38*		
	Upper-middle	*5.62 – 14.25*	*9.69 ± 1.98*		
	High	*3.42 – 23.22*	*8.48 ± 2.52*		
	Total	***3.42 – 23.22***	***8.30 ± 2.46***		
Lactating	*Low*	*7.65 – 40.58*	*15.37 ± 7.84*	*.000*	*Sig.*
	Lower-middle	*4.84 – 40.29*	*13.30 ± 6.39*		
	Upper-middle	*4.80 – 39.79*	*15.22 ± 7.55*		
	High	*4.84 – 39.79*	*18.85 ± 9.11*		
	Total	***4.80 – 40.58***	***16.89 ± 8.57***		
Non-Pregnant Non-Lactating	*Low*	*4.51 – 11.88*	*7.59 ± 1.95*	*.000*	*Sig.*
	Lower-middle	*3.92 – 12.56*	*7.65 ± 1.91*		
	Upper-middle	*4.37 – 12.40*	*7.73 ± 1.83*		
	High	*4.42 – 15.53*	*9.34 ± 2.28*		
	Total	***3.92 – 15.53***	***8.51 ± 2.25***		
Overall	**Low**	**4.49 – 40.58**	**10.67 ± 5.71**	**.000**	**Sig.**
	Lower-middle	**3.59 – 40.29**	**9.27 ± 3.90**		
	Upper-middle	**4.37 – 39.79**	**10.67 ± 5.07**		
	High	**3.42 – 39.79**	**12.06 ± 6.56**		
	Total	**3.42 – 40.58**	**11.08 ± 5.86**		

The data from the above table shows that mothers belonging to high socio-economic status had slightly higher mean dietary iron intake (12.06 ± 6.56 mgs) as compared to mothers belonging to upper-middle socio-economic status (10.67 ± 5.07 mgs) compared to lower-middle socio-economic status (9.27 ± 3.90 mgs) or low socio-economic status group (10.67 ± 5.71 mgs).

This trend showed consistency in women belonging to almost all physiological groups i.e. women from high socio-economic status in pre-pregnant group had high dietary iron intake (11.07 $\pm$ 10.62 mgs), lactating group had 18.85 $\pm$ 9.11 mgs and non-pregnant non-lactating group had 12.06 $\pm$ 6.56 mgs.

However, incase of pregnant women dietary iron intake per day was highest in women of upper-middle socio-economic status (9.6 $\pm$ 2.52 mgs) followed by those who were part of high socio-economic status group (8.48 $\pm$ 2.52 mgs).

TABLE- 81: PERCENTAGE OF WOMEN WITH DIFFERENT IRON INTAKE WITH RELATION TO TYPE OF FAMILY

Physiological Status	Type of Family	Dietary Iron Intake / Day					
		Normal		Below Normal		Total	
		No.	%age	No.	%age	No.	%age
Pre-Pregnant	Joint	–	–	363	100.0	363	100.0
	Nuclear	–	–	37	100.0	37	100.0
	Total	–	–	**400**	**100.0**	**400**	**100.0**
Pregnant	Joint	–	–	333	100.0	333	100.0
	Nuclear	–	–	67	100.0	67	100.0
	Total	–	–	**400**	**100.0**	**400**	**100.0**
Lactating	Joint	34	11.8	254	88.2	288	100.0
	Nuclear	15	13.4	97	86.6	112	100.0
	Total	**49**	**12.3**	**351**	**87.7**	**400**	**100.0**
Non-Pregnant Non-Lactating	Joint	–	–	197	100.0	197	100.0
	Nuclear	–	–	203	100.0	203	100.0
	Total	–	–	**400**	**100.0**	**400**	**100.0**
Overall	**Joint**	**34**	**2.9**	**1147**	**97.1**	**1181**	**100.0**
	Nuclear	**15**	**3.6**	**404**	**96.4**	**419**	**100.0**
	Total	**49**	**3.1**	**1551**	**96.9**	**1600**	**100.0**

Pearson Chi – Square (x^2) = 0.512, p = .474 (Insig.)

It can be observed from above data that a minor fraction of women belonging to lactating group had normal dietary iron intake as compared to pre-pregnant, pregnant and non-pregnant non-lactating

groups who had below normal iron intake.\

It can also be observed that percentage of women belonging to nuclear families having normal dietary iron intake was slightly higher (3.6%) as compared to women in joint families (2.9%). However these differences were statistically insignificant.

TABLE- 82 : MEAN IRON INTAKE PER DAY OF WOMEN WITH RESPECT TO TYPE OF FAMILY

Physiological Status	Type of Family	Iron Intake (mgs) / day Range	Mean ± S.D.
Pre-Pregnant	*Joint (n = 363)*	*6.25 – 16.78*	*10.60 ± 2.21*
	Nuclear (n = 37)	*8.50 – 15.45*	*10.83 ± 1.52*
	Total (n = 400)	***6.25 – 16.78***	***10.62 ± 2.15***
Pregnant	*Joint (n = 333)*	*3.42 – 23.22*	*8.36 ± 2.59*
	Nuclear (n = 67)	*5.21 – 11.86*	*7.98 ± 1.62*
	Total (n = 400)	***3.42 – 23.22***	***8.30 ± 2.46***
Lactating	*Joint (n = 288)*	*4.80 – 40.29*	*16.34 ± 8.58*
	Nuclear (n = 112)	*4.84 – 40.58*	*18.32 ± 8.42*
	Total (n = 400)	***4.80 – 40.50***	***16.89 ± 8.57***
Non-Pregnant Non-Lactating	*Joint (n = 197)*	*4.10 – 15.53*	*8.42 ± 2.39*
	Nuclear (n = 203)	*3.92 – 15.18*	*8.59 ± 2.10*
	Total (n = 400)	***3.92 – 15.53***	***8.51 ± 2.25***
Overall	**Joint (n = 1181)**	**3.42 – 40.29**	**11.00 ± 5.68**
	Nuclear (n = 419)	**3.92 – 40.58**	**11.29 ± 6.33**
	Total (n = 1600)	**3.42 – 40.58**	**11.08 ± 5.86**

p = .000 Sig.

It can be assessed from above data that mean iron intake in relation to type of family showed nominal variations in women of pre-pregnant, pregnant and non-pregnant non-lactating groups. However, in case of lactating group those belonging to nuclear families had slightly higher intake (18.32 ± 8.42 mgs) as compared to those who were part of joint families (16.34 ± 8.58 mgs).

TABLE- 83 : MEAN DIETARY IRON INTAKE PER DAY OF WOMEN WITH RELATION TO OCCUPATION

Physiological Status	Type of Family	Iron Intake (mgs) / day Range	Mean ± S.D.	p value	Result
Pre-Pregnant	Housewives	6.25 – 16.78	11.0661 ± 2.1240	.000	Sig.
	Unskilled	7.17 – 15.23	10.4197 ± 2.0955		
	Semiskilled	6.74 – 13.02	9.2492 ± 1.7650		
	Skilled	7.26 – 15.52	10.4856 ± 2.0970		
	Professional	9.73 – 15.88	11.9240 ± 2.5773		
	Total	**6.25 – 16.78**	**10.6252 ± 2.1562**		
Pregnant	Housewives	3.42 – 14.25	8.4547 ± 2.2051	.001	Sig.
	Unskilled	4.10 – 12.77	7.8620 ± 2.2656		
	Semiskilled	4.68 – 10.09	7.4152 ± 1.4912		
	Skilled	5.90 – 23.22	9.4596 ± 3.7468		
	Professional	7.17 – 9.23	8.2957 ± 0.8173		
	Total	**3.42 – 23.22**	**8.3053 ± 2.4615**		
Lactating	Housewives	4.84 – 39.79	17.0442 ± 9.2952	.000	Sig.
	Unskilled	4.80 – 40.58	14.8382 ± 7.3075		
	Semiskilled	10.40 – 37.94	18.9562 ± 9.1705		
	Skilled	8.53 – 38.70	20.6519 ± 6.9144		
	Professional	10.50 – 32.38	24.4531 ± 8.5403		
	Total	**4.80 – 40.58**	**16.8952 ± 8.5745**		
Non-Pregnant Non-Lactating	Housewives	4.62 – 15.53	8.9777 ± 2.2320	.000	Sig.
	Unskilled	4.10 – 10.97	7.4565 ± 1.9265		
	Semiskilled	3.92 – 11.88	8.2894 ± 1.7366		
	Skilled	5.04 – 15.18	9.1975 ± 2.6167		
	Professional	4.42 – 10.70	8.2418 ± 1.5985		
	Total	**3.92 – 15.53**	**8.5124 ± 2.2517**		
Overall	Housewives	3.42 – 39.79	11.3763 ± 6.0774	.000	Sig.
	Unskilled	4.10 – 40.58	10.4383 ± 5.2484		
	Semiskilled	3.92 – 37.94	9.3143 ± 4.1441		
	Skilled	5.04 – 38.70	12.0635 ± 6.1224		
	Professional	4.42 – 32.38	13.4516 ± 8.4482		
	Total	3.42 – 40.58	11.0845 ± 5.8626		

The table shows that mean iron intake of women shows slight variations in relation to occupation. Overall professional women had highest mean iron intake of 13.4516 ± 8.4482 mgs, followed by skilled women (12.0635 ± 6.1224 mgs), housewives (11.3763 ± 6.0774 mgs)

unskilled ladies (10.4383 ± 5.2484 mgs) and semiskilled mothers (9.3143 ± 4.1441 mgs) respectively.

However, this tend did not hold true for women belonging to different physiological groups.

In pre-pregnant women mean iron intake of housewives and professional ladies was highest and almost same (11.0661 ± 2.1240 mgs and 11.9240 ± 2.5773 mgs respectively). They were followed by skilled and unskilled group of women whose mean iron intake was almost same (10.4856 ± 2.0970 mgs). The mean iron intake of semiskilled women was least in this group (9.2492 ±1.7650 mgs).

Regarding pregnant women it was seen that skilled women had highest mean dietary iron intake of 9.4596 ± 3.7468 mgs. Furthermore mean dietary iron intake of housewives and professional pregnant women was almost same (8.4547 ± 2.205 mgs and 8.2957 ± 0.8173 mgs respectively) followed by unskilled and semiskilled group of pregnant women whose dietary iron intake was almost same (7.8620 ± 2.656 mgs and 7.4152 ± 1.4912 mgs respectively).

As far as lactating women were concerned the mean dietary iron intake of women of this category showed significant difference, with professional women leading the group (21.4531 ± 8.5403 mgs). They were followed by skilled (20.6519 ± 6.9144 mgs), semiskilled (18.9562 ± 9.1705 mgs) and unskilled women (14.8382 ± 7.3075 mgs) respectively.

In case of women belonging to non-pregnant non-lactating group highest dietary iron intake was seen incase of skilled women (9.1975 ± 2.6167 mgs) followed by.professional group (8.2418 ± 1.5985), semiskilled (8.2894 ± 1.7366 mgs) and housewives (8.9777 ± 2.2320 mgs) whose dietary intake was almost same.

TABLE- 84 : MEAN DIETARY IRON INTAKE PER DAY OF WOMEN IN RELATION TO LITERACY STATUS

Physiological Status	Literacy Status	Iron Intake (mgs) / day Range	Mean $\pm$ S.D.	p value	Result
	Illiterate	*6.25 – 15.13*	*9.9725 $\pm$ 2.1212*		
Pre-Pregnant	*Literate*	*6.69 – 16.78*	*10.9805 $\pm$ 2.0949*	*.000*	*Sig.*
	Total	***6.25 – 16.78***	***10.6252 $\pm$ 2.1562***		
	Illiterate	*3.59 – 13.55*	*7.8710 $\pm$ 2.3487*		
Pregnant	*Literate*	*3.42 – 23.22*	*8.7144 $\pm$ 2.5005*	*.001*	*Sig.*
	Total	***3.42 – 23.22***	***8.3053 $\pm$ 2.4615***		
	Illiterate	*4.80 – 40.58*	*15.2425 $\pm$ 8.1401*		
Lactating	*Literate*	*4.84 – 40.29*	*18.4208 $\pm$ 8.7009*	*.000*	*Sig.*
	Total	***4.80 – 40.58***	***16.8952 $\pm$ 8.5745***		
	Illiterate	*3.92 – 12.68*	*7.7536 $\pm$ 1.9395*		
Non-Pregnant Non-Lactating	*Literate*	*4.42 – 15.53*	*9.1207 $\pm$ 2.3034*	*.000*	*Sig.*
	Total	***3.92 – 15.53***	***8.5124 $\pm$ 2.2517***		
	Illiterate	**3.59 – 40.58**	**10.2692 $\pm$ 5.5927**		
Overall	**Literate**	**3.42 – 40.29**	**11.7268 $\pm$ 5.9921**	**.001**	**Sig.**
	Total	**3.42 – 40.58**	**11.0845 $\pm$ 5.8626**		

The above table reveals that there was a significant difference in the mean iron intake of women (p = < .05). Data further more depicts that mean iron intake of literate women was greater than those of illiterate women belonging to all physiological groups i.e. for overall category the mean iron intake of literate women was 11.7268 $\pm$ 5.9921 mgs as compared to 10.2692 $\pm$ 5.5927 mgs in case of illiterate women. The mean iron intake of pre-pregnant literate women was 10.9805 $\pm$ 2.0949 mgs as compared to 9.9725 $\pm$ 2.1212 mgs in illiterate women. In pregnant group mean iron intake of literate women was 8.7144 $\pm$ 2.5005 mgs as compared to 7.8710 $\pm$ 2.3487 mgs for illiterate women.

As far as lactating mothers were concerned it was seen that mean iron intake for literate group was 18.4208 $\pm$ 8.7009 mgs as compared to 15.2425 $\pm$ 8.1401 mgs in illiterate women, whereas these values were 9.1207 $\pm$ 2.3034 mgs for literate as compared to 7.536 $\pm$ 1.9395 mgs in illiterate women.

H: RELATIONSHIP OF VARIOUS SOCIO-EPIDEMIOLOGICAL FACTORS WITH DEGREE OF MALNUTRTION

TABLE – 85: DEGREE OF MALNUTRITION IN RELATION TO TYPE OF FAMILY

Physiological Status	Type of Family	Severe		Moderate		Mild		Normal		Obese Grade I		Obese Grade II		Total		x^2	p value	Result
		No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age			
Pre-Pregnant	Joint	2	0.6	9	2.5	40	11.0	272	74.8	38	10.5	2	0.6	363	100.0	2.470	.781	Insig.
	Nuclear	–	–	1	2.7	4	10.8	28	75.7	3	8.1	1	2.7	37	100.0			
	Total	2	0.5	10	2.5	44	11.0	300	75.0	41	10.3	3	0.7	400	100.0			
Pregnant	Joint	2	0.6	6	1.8	8	0.4	236	70.9	62	18.6	19	5.7	333	100.0	3.913	.562	Insig.
	Nuclear	–	–	2	3.0	–	–	44	65.6	17	25.4	4	6.0	67	100.0			
	Total	2	0.5	8	2.0	8	2.0	280	70.0	79	19.8	23	5.7	400	100.0			
Lactating	Joint	6	2.1	6	2.1	29	10.1	199	69.1	41	14.2	7	2.4	288	100.0	.992	.505	Insig.
	Nuclear	2	1.8	2	1.8	9	8.0	80	71.4	16	14.3	3	2.7	112	100.0			
	Total	8	2.0	8	2.0	38	9.5	279	69.7	57	14.3	10	2.5	400	100.0			
Non-Pregnant Non-Lactating	Joint	2	1.0	6	3.0	15	7.7	121	61.4	50	25.4	3	1.5	197	100.0	3.976	.553	Insig.
	Nuclear	–	–	10	4.9	13	6.4	129	63.5	46	22.7	5	2.5	203	100.0			
	Total	2	0.5	16	4.0	28	7.0	250	62.5	96	24.0	8	2.0	400	100.0			
Overall	Joint	12	1.0	27	2.3	92	7.8	828	70.1	191	16.2	31	2.6	1181	100.0	6.814	.235	insig.
	Nuclear	2	0.5	15	3.6	26	6.2	281	67.1	82	19.6	13	3.0	419	100.0			
	Total	14	0.9	42	2.6	118	7.4	1109	69.3	273	17.1	44	2.7	1600	100.0			

Analysis of degree of malnutrition among mothers in relation of type of family shows that 70.1% ladies nutritionally normal belong to joint family system as compared to 67.1% women residing in nuclear families. Further more the percentage of pre-pregnant women who were normal was almost same (75.7%) for those who were residing in nuclear families compared to those living in joint families (74.8%).

In pregnant group it was seen that percentage of normal women was slightly higher (70.9%) in women living in joint families as compared to (65.6%) those living in nuclear families.

Lactating and non-pregnant non-lactating women showed a different trend with percentage of normal women being higher in those who lived in nuclear families (71.4% and 63.5% respectively) as compared to those living in joint families (69.1% and 61.4% respectively).

TABLE- 86: DEGREE OF MALNUTRITION IN RELATION TO GROUPED AGE

Physiological Status	Group Age	Degree of Malnutrition: Severe No.	Severe %age	Moderate No.	Moderate %age	Mild No.	Mild %age	Normal No.	Normal %age	Obese Grade I No.	Obese Grade I %age	Obese Grade II No.	Obese Grade II %age	Total No.	Total %age	p value	Result
Pre-Pregnant	< or = 20	2	1.5	8	6.1	15	11.4	94	71.2	13	9.8	–	–	132	100.0	.009	Sig.
	21-30	–	–	1	0.5	29	11.9	185	76.1	26	10.7	2	0.8	243	100.0		
	> 30	–	–	1	4.0	–	–	21	84.0	2	8.0	1	4.0	25	100.0		
	Total	**2**	**0.5**	**10**	**2.5**	**44**	**11.0**	**300**	**75.0**	**41**	**10.3**	**3**	**0.8**	**400**	**100.0**		
Pregnant	< or = 20	2	2.4	8	9.5	–	–	58	69.0	9	10.7	7	8.4	84	100.0	.000	Sig.
	21-30	–	–	–	–	8	2.9	203	72.7	57	20.5	11	3.9	279	100.0		
	> 30	–	–	–	–	–	–	19	51.4	13	35.1	5	13.5	37	100.0		
	Total	**2**	**0.5**	**8**	**2.0**	**8**	**2.0**	**280**	**70.0**	**79**	**19.8**	**23**	**5.8**	**400**	**100.0**		
Lactating	< or = 20	2	12.5	–	–	1	6.25	12	75	1	6.25	–	–	16	100.0	.013	Sig.
	21-30	4	1.5	6	2.2	31	11.5	187	69.2	39	14.5	3	1.1	270	100.0		
	> 30	2	1.8	2	1.8	6	5.2	80	70.2	17	14.9	7	6.1	114	100.0		
	Total	**8**	**2.0**	**8**	**2.0**	**38**	**9.5**	**279**	**69.7**	**57**	**14.3**	**10**	**2.5**	**400**	**100.0**		
Non-Pregnant Non-Lactating	< or = 20	–	–	–	–	–	–	2	100.0	–	–	–	–	2	100.0	.217	Insig
	21-30	2	2.0	3	3.1	7	7.1	56	57.1	30	30.7	–	–	98	100.0		
	> 30	–	–	13	4.3	21	7.0	192	64.0	66	22.0	8	2.7	300	100.0		
	Total	**2**	**0.5**	**16**	**4.0**	**28**	**7.0**	**250**	**62.5**	**96**	**24.0**	**8**	**2.0**	**400**	**100.0**		
Overall	< or = 20	6	2.6	16	6.8	16	6.8	166	70.9	23	9.9	7	3.0	234	100.0	.000	Sig.
	21-30	6	0.7	10	1.1	75	8.5	631	70.9	152	17.0	16	1.8	890	100.0		
	> 30	2	0.4	16	3.4	27	5.7	312	65.5	98	20.6	21	4.4	476	100.0		
	Total	**14**	**0.8**	**42**	**2.6**	**118**	**7.4**	**1109**	**69.3**	**273**	**17.1**	**44**	**2.8**	**1600**	**100.0**		

Pearson Chi-square (x2) = 56.704

Degree of malnutrition as assessed by BMI among women in different age groups showed that highest percentage of women having varying degree of malnutrition were in the age group of ≤ 20 years (16.2%) followed by those between 21-30 years of age (10.3%) and lastly by women who were more than 30 years of age. This rend was followed by women belonging to pre-pregnant, pregnant and lactating groups i.e. percentage of women having varying degree of malnutrition being highest in women in the age group of ≤ 20 years, followed by women in the age group of 21-30 years and women who were more than 30 years of age respectively. The only exception to this was women belonging to non-pregnant non-lactating group. Here the highest percentage of women with varying degree of malnutrition were in the age groups of 21-30 years (12.2%) followed by women who were more than 30 years of age (11.3%). The data further reveals that the percentage of women having varying degree of malnutrition in the pre-pregnant group was 19.0% for women in the age group of ≤ 20 years. This percentage was 12.4 % for women in the age group of 21-30 years and 4.0% for women who were more than 30 years of age. For pregnant women these percentages were 11.9%, 12.9% and 0.0% for women in the age group of ≤ 20 years and 21-30 years and > 30 years respectively. For lactating women these percentages were 18.75%, 15.2 % and 8.8% from women in the age group of ≤ 20 years, 21-30 years and > 30 years of age respectively.

TABLE – 87: DEGREE OF MALNUTRITION WITH RESPECT TO OCCUPATION OF SAMPLE

Physiological Status	Occupation	Degree of Malnutrition												Total	
		Severe		Moderate		Mild		Normal		Obese Grade I		Obese Grade II			
		No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pre-pregnant	Housewives	–	–	1	0.6	19	11.4	134	80.7	11	6.6	1	0.7	166	100.0
	Un-Skilled	2	1.4	3	2.2	11	7.9	106	76.3	17	12.2	–	–	139	100.0
	Semi-Skilled	–	–	5	13.5	8	21.6	22	59.5	2	5.4	–	–	37	100.0
	Skilled	–	–	1	2.1	4	8.3	30	62.5	11	22.9	–	–	48	100.0
	Professional	–	–	–	–	2	20.0	8	80.0	–	–	–	–	10	100.0
	Total	**2**	**0.5**	**10**	**2.5**	**44**	**11.0**	**300**	**75.0**	**41**	**10.3**	**2**	**4.2**	**400**	**100.0**
Pregnant	Housewives	–	–	2	1.2	5	2.9	102	60.0	44	25.9	17	10.0	170	100.0
	Un-Skilled	2	1.4	4	2.7	3	2.1	118	81.4	18	12.4	–	–	145	100.0
	Semi-Skilled	–	–	2	9.5	–	–	14	66.7	5	23.8	–	–	21	100.0
	Skilled	–	–	–	–	–	–	36	72.0	9	18.0	5	10.0	50	100.0
	Professional	–	–	–	–	–	–	10	71.4	3	21.4	1	7.2	14	100.0
	Total	**2**	**0.5**	**8**	**2.0**	**8**	**2.0**	**280**	**70.0**	**79**	**19.8**	**23**	**5.7**	**400**	**100.0**
Lactating	Housewives	–	–	–	–	5	2.9	133	76.0	30	17.1	7	4.0	175	100.0
	Un-Skilled	8	5.1	5	3.2	32	20.3	101	63.9	9	5.7	3	1.9	158	100.0
	Semi-Skilled	–	–	2	25.0	1	12.5	3	37.5	2	25.0	–	–	18	100.0
	Skilled	–	–	1	2.3	–	–	35	81.4	7	16.3	–	–	43	100.0
	Professional	–	–	–	–	–	–	7	43.8	9	56.2	–	–	16	100.0
	Total	**8**	**2.0**	**8**	**2.0**	**38**	**9.5**	**279**	**69.8**	**57**	**14.3**	**10**	**2.5**	**400**	**100.0**
Non-Pregnant Non-Lactating	Housewives	–	–	9	4.9	4	2.2	106	57.3	63	34.1	3	1.6	185	100.0
	Un-Skilled	2	1.9	2	1.9	18	16.8	69	64.5	11	10.3	5	4.7	107	100.0
	Semi-Skilled	–	–	3	8.8	6	17.6	20	58.8	5	14.7	–	–	34	100.0
	Skilled	–	–	–	–	–	–	44	77.2	13	22.8	–	–	57	100.0
	Professional	–	–	2	11.8	–	–	11	64.7	4	23.5	–	–	17	100.0
	Total	**2**	**0.5**	**16**	**4.0**	**28**	**7.0**	**250**	**62.5**	**96**	**24.0**	**8**	**2.0**	**400**	**100.0**

Continued.....

Physiological Status	Occupation	Degree of Malnutrition												Total	
		Severe		Moderate		Mild		Normal		Obese Grade I		Obese Grade II			
		No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Overall	Housewives	–	–	12	1.7	33	4.8	475	68.2	148	21.3	28	4.0	696	100.0
	Un-Skilled	14	2.6	14	2.6	64	11.6	394	71.7	55	10.0	8	1.5	549	100.0
	Semi-Skilled	–	–	12	12.0	15	15.0	59	59.0	14	14.0	–	–	100	100.0
	Skilled	–	–	2	1.0	4	2.0	145	73.2	40	20.2	7	3.5	198	100.0
	Professional	–	–	2	3.5	2	3.5	36	63.2	16	28.1	1	1.7	57	100.0
	Total	14	0.9	42	2.6	118	7.4	1109	69.3	273	17.1	44	2.8	1600	100.0

p = .401 (*Insig*)

Overall majority of women who were nutritionally normal belonged to skilled group (73.2%) followed by unskilled (71.7%) and housewives (68.2%) respectively.

In case of pre-pregnant women it was seen that percentage of nutritionally normal women was almost same among housewives (80.7%) and professional ladies (80.0%). They were followed by unskilled group with 76.3% women categorized as normal.

However, in pregnant group unskilled women tool the lead with 81.4% women categorized as normal, followed by skilled (72.0%) and professional (71.4%) women respectively.

The data further reveals that in lactating group again highest percentage of women categorized normal belonged to skilled women (81.4%), followed by housewives. Same was true for 77.2% non-pregnant non-lactating skilled women and 64.5% unskilled women.

TABLE- 88: DEGREE OF MALNUTRITION WITH RESPECT TO LITERACY STATUS

Physiological Status	Literacy Status	Degree of Malnutrition: Severe NO.	Severe %age	Moderate NO.	Moderate %age	Mild NO.	Mild %age	Normal NO.	Normal %age	Obese Grade I NO.	Obese Grade I %age	Obese Grade II NO.	Obese Grade II %age	Total NO.	Total %age
Pre-Pregnant	Illiterate	–	–	6	4.3	18	12.8	103	73.0	14	9.9	–	–	141	100.0
	Literate	2	0.8	4	1.5	26	10.0	197	76.1	27	10.4	3	1.2	259	100.0
	Total	**2**	**0.5**	**10**	**2.5**	**44**	**11.0**	**300**	**75.0**	**41**	**10.3**	**3**	**0.7**	**400**	**100.0**
Pregnant	Illiterate	2	1.0	6	3.1	6	3.1	152	78.4	23	11.9	5	2.5	194	100.0
	Literate	–	–	2	1.0	2	1.0	128	62.1	56	27.2	18	8.7	206	100.0
	Total	**2**	**0.5**	**8**	**2.0**	**8**	**2.0**	**280**	**70.0**	**79**	**19.8**	**23**	**5.8**	**400**	**100.0**
Lactating	Illiterate	8	4.2	5	2.5	33	17.2	128	66.7	15	7.8	3	1.6	192	100.0
	Literate	–	–	3	1.4	5	2.4	151	72.6	42	20.2	7	3.4	208	100.0
	Total	**8**	**2.0**	**8**	**2.0**	**38**	**9.5**	**279**	**69.7**	**57**	**14.3**	**10**	**2.5**	**400**	**100.0**
Non-Pregnant Non-Lactating	Illiterate	2	1.1	7	3.9	25	14.1	114	64.0	25	14.1	5	2.8	178	100.0
	Literate	–	–	9	4.1	3	1.3	136	61.3	71	32.0	3	1.3	222	100.0
	Total	**2**	**0.5**	**16**	**4.0**	**28**	**7.0**	**250**	**62.5**	**96**	**24.0**	**8**	**2.0**	**400**	**100.0**
Overall	**Illiterate**	**12**	**0.8**	**24**	**1.5**	**82**	**5.1**	**497**	**31.1**	**77**	**4.8**	**13**	**0.7**	**705**	**44.1**
	Literate	**2**	**0.1**	**18**	**1.1**	**36**	**2.3**	**612**	**38.3**	**196**	**12.3**	**31**	**1.9**	**895**	**55.9**
	Total	**14**	**0.9**	**42**	**2.6**	**118**	**7.4**	**1109**	**69.3**	**273**	**17.1**	**44**	**2.7**	**1600**	**100.0**

Pearson Chi-square x^2 = 75.596, p = .000 (Sig.)

The degree of malnutrition in relation to literacy status of women shows that overall highest percentage of women categorized as normal as per BMI belonged to literate group (38.3%) compared to (31.1%) illiterate women. Further it was observed that 7.4% of women having severe, moderate or mild malnutrition were from illiterate group as compared to 3.5% literate mothers. These differences were statistically significant also (p = .000).

This was true from pre-pregnant, pregnant, lactating and non-pregnant non-lactating women also. However, the percentage of pregnant women categorized as normal was highest among illiterate mothers in pregnant group (78.4%) as compared to (62.1%) for literate women. It was also observed regarding the pregnant literate women that most of them 35.9% were obese (Grade I and Grade II) as compared to 24.4% obese women (Grade I and Grade II) in illiterate group.

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This was true from pre-pregnant, pregnant, lactating and non-

pregnant non-lactating women also. However, the percentage of pregnant women categorized as normal was highest among illiterate mothers in pregnant group (78.4%) as compared to (62.1%) for literate women. It was also observed regarding the pregnant literate women that most of them 35.9% were obese (Grade I and Grade II) as compared to 24.4% obese women (Grade I and Grade II) in illiterate group.

I: RELATIONSHIP OF VARIOUS SOCIO-EPIDEMIOLOGICAL FACTORS WITH SPECIAL FOODS CONSUMED DURING PREGNANCY / LACTATION

TABLE- 89: SPECIAL FOODS CONSUMED DURING PREGNANCY / LACTATION WITH RESPECT TO GROUPED AGE

Physiological Status	Grouped Age (Years)	Special Foods Consumed No.	Special Foods Consumed % age	x^2	p value	Result
	< or = 20	31	15.8			
Pregnant (n = 196)	21 – 30	142	72.5	7.884	.019	Sig.
	> 30	23	11.7			
	Total	**196**	**100.0**			
	< or = 20	16	4.5			
Lactating (n = 358)	21 – 30	244	68.1	3.611	.164	Insig.
	> 30	98	27.4			
	Total	**358**	**100.0**			
	< or = 20	47	8.5			
Overall (n = 554)	21 – 30	386	69.6	31.936	.002	Sig.
	> 30	121	21.9			
	Total	**554**	**100.0**			

Overall percentage of women consuming special foods was highest among women in the age group 21-30 years (69.6%) followed by mothers in above 30 years age group (21.9%) and lowest in ≤ 20 years of age (8.5%).

Lactating women followed the same trend with highest percentage of women consuming special foods in age group of 21-30 years (68.1%), followed by mothers in age group and above 30 years (27.4%) and lowest percentage in mothers ≤ 20 years of age (4.5%). Furthermore incase of pregnant ladies although the percentage of women consuming special foods was highest among those who were in 21-30 years age group (72.5%), followed by those who were ≤ 20 years of age (15.8%) and lastly by ladies more than 30 years of age 11.7%.

TABLE- 90 : SPECIAL FOODS CONSUMED DURING PREGNANCY / LACTATION WITH RESPECT TO SOCIO-ECONOMIC STATUS

Physiological Status	Socio – Economic Status: Low		Lower Middle		Upper Middle		High		Overall	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
Pregnant	16	8.2	19	9.7	34	17.3	127	64.8	196	100.0
Lactating	68	19.0	51	14.2	59	16.5	180	50.3	358	100.0
Overall	84	15.2	70	12.6	93	16.8	307	55.4	554	100.0

It can be collected from data that majority of women (55.4%) consuming special foods during pregnancy / lactation belonged to high socio-economic group. However, there was not much difference among the women belonging to low (15.2%) and lower-middle (12.6%) and upper-middle groups (16.8%).

TABLE- 91: SPECIAL FOODS CONSUMED DURING PREGNANCY / LACTATION WITH RESPECT TO TYPE OF FAMILY

Physiological Status	Women Consuming Special Foods		Type of Family: Joint		Nuclear	
	No.	%age	No.	%age	No.	%age
Pregnant	*196*	*100.0*	*168*	*85.7*	*28*	*14.3*
Lactating	*358*	*100.0*	*257*	*71.8*	*101*	*28.2*
Overall	**554**	**100.0**	**425**	**76.7**	**129**	**23.3**

Pearson Chi-square (x2) = 13.752, p = .001 (Sig.)

The above table depicts that 76.7% women belonging to joint families consumed special foods as compared to 23.3% women belonging to nuclear families. The data further reveals that similar trend was seen during pregnancy (85.7%) and lactation (71.8%) for special foods. It indicates that type of family has bearing on consumption of special foods during pregnancy.

TABLE- 92: SPECIAL FOODS CONSUMED DURING PREGNANCY / LACTATION WITH RESPECT TO OCCUPATION

Physiological Status	Occupation	Special Foods Consumed	
		No.	% age
Pregnant (n = 196)	*Housewives*	*102*	*52.0*
	Unskilled	*39*	*19.9*
	Semiskilled	*6*	*3.1*
	Skilled	*40*	*20.4*
	Professional	*9*	*4.6*
	Total	***196***	***100.0***
Lactating (n = 358)	*Housewives*	*142*	*39.7*
	Unskilled	*158*	*44.1*
	Semiskilled	*8*	*2.2*
	Skilled	*36*	*10.1*
	Professional	*14*	*3.9*
	Total	***358***	***100.0***
Overall (n = 554)	**Housewives**	**244**	**44.1**
	Unskilled	**197**	**35.5**
	Semiskilled	**14**	**2.5**
	Skilled	**76**	**13.7**
	Professional	**23**	**4.2**
	Total	**554**	**100.0**

Pearson Chi-square (x2) = 16.460, p = .002 (Sig.)

It can be observed from above table that overall highest percentage of women consuming special foods was among housewives (44.1%), followed by unskilled women (35.5%), skilled (13.7%), professional (4.2%) and semiskilled (2.5%) respectively.

However this trend did not show consistency separately in pregnant as well as lactating group of women. In case of pregnant women although the percentage was highest among housewives (52.0%) however, they were followed by skilled women (20.4%), unskilled (19.9%), professionals (4.6%) and semiskilled (3.1%) respectively. Whereas in case of lactating women highest percentage of women consuming special foods was among unskilled women (44.1%), followed by housewives (39.7%), skilled (10.1%), professional (3.9%) and semiskilled (2.2%) respectively.

TABLE- 93 : SPECIAL FOODS CONSUMED DURING PREGNANCY / LACTATION WITH RESPECT TO LITERACY STATUS

Physiological Status	Literacy Status				Total	
	Illiterate		Literate			
	No.	%age	No.	%age	No.	%age
Pregnant	*53*	*27.0*	*143*	*73.0*	*196*	*100.0*
Lactating	*187*	*52.2*	*171*	*47.8*	*358*	*100.0*
Overall	**240**	**43.3**	**314**	**56.7**	**554**	**100.0**

x2 = 32.741 p = .001 Sig.

The above table shows that more than half (56.7%) women consuming special foods were literate. It further depicts that majority of pregnant women (73.0%) consuming special foods were literate as compared to 27.0% illiterate women.

However, there was not much difference in the percentage of illiterate (52.2%) and literate (47.8%) lactating women consuming special foods during lactation.

J : RELATIONSHIP OF VARIOUS SOCIO-EPIDIMEIOLOGICAL FACTORS WITH NUTRITIONAL KNOWLEDGE

TABLE- 94: OVERALL ASSESSMENT OF NUTRITIONAL KNOWLEDGE OF WOMEN WITH RESPECT TO SOCIO-ECONOMIC STATUS

Physiological Status	Socio-economic Status	Overall Assessment of Nutritional Knowledge							
		Good		Fair		Poor		Total	
		No.	%age	No.	%age	No.	%age	No.	%age
Pre-Pregnant	*Low*	–	–	32	65.3	17	34.7	49	100.0
	Lower-middle	4	4.2	59	62.1	39	33.7	95	100.0
	Upper-middle	5	7.8	35	54.7	24	37.5	64	100.0
	High	99	51.6	67	34.9	26	13.5	192	100.0
	Total	**108**	**27.0**	**193**	**48.3**	**99**	**24.7**	**400**	**100.0**
Pregnant	*Low*	4	7.3	2	3.6	49	89.1	55	100.0
	Lower-middle	3	2.9	–	–	100	97.1	103	100.0
	Upper-middle	–	–	11	22.0	39	78.0	50	100.0
	High	79	41.1	90	46.9	23	12.0	192	100.0
	Total	**86**	**21.5**	**103**	**25.7**	**211**	**52.8**	**400**	**100.0**
Lactating	*Low*	–	–	6	8.8	62	91.2	68	100.0
	Lower-middle	1	1.8	9	16.7	44	81.5	54	100.0
	Upper-middle	–	–	9	13.2	59	86.8	68	100.0
	High	67	31.9	58	27.6	85	40.5	210	100.0
	Total	**68**	**17.0**	**82**	**20.5**	**250**	**62.5**	**400**	**100.0**
Non-Pregnant Non-Lactating	*Low*	–	–	10	20.8	38	79.2	48	100.0
	Lower-middle	1	1.4	19	26.8	51	71.8	71	100.0
	Upper-middle	2	2.5	30	37.5	48	60.0	80	100.0
	High	78	38.8	86	42.8	37	18.4	201	100.0
	Total	**81**	**20.3**	**145**	**36.2**	**174**	**43.5**	**400**	**100.0**
Overall	Low	4	1.8	50	22.7	166	75.5	220	100.0
	Lower-middle	9	2.8	87	26.9	227	70.3	323	100.0
	Upper-middle	7	2.7	85	32.4	170	64.9	262	100.0
	High	323	40.6	301	37.9	171	21.5	795	100.0
	Total	**343**	**21.4**	**523**	**32.7**	**734**	**45.9**	**1600**	**100.0**

Pearson Chi-square (x^2) = 495.416, p = .000 (Sig.) at all levels.

The above table depicts that overall majority of women (78.5%) belonging to high socio-economic status had good or fair nutritional knowledge. Whereas only 35.1% if the women belonging to upper-middle class possessed good or fair nutritional knowledge followed by women belonging to lower-middle class which was 29.7%. The lowest percentage of women possessing good and fair nutritional knowledge (24.5%) was amongst the group of women belonging to low socio-economic status.

The table further reveals that the percentage of women belonging

to high socio-economic status possessing good or fair nutritional knowledge was highest among pregnant women (88.0%), followed by pre-pregnant group (86.5%). 81.6% non-pregnant non-lactating women belonging to high socio-economic status had good or fair nutritional knowledge, where as same was true for 59.5% lactating women.

These differences were statistically significant.

TABLE- 95: OVERALL ASSESSMENT OF NUTRITIONAL KNOWLEDGE OF WOMEN WITH RESPECT TO OCCUPATION.

Physiological Status	Occupation	Overall Assessment of Nutritional Knowledge: Good		Fair		Poor		Total	
		No.	%age	No.	%age	No.	%age	No.	%age
Pre-Pregnant	Housewives	65	39.2	70	42.2	31	18.6	166	100.0
	Unskilled	2	1.4	80	57.6	57	41.0	139	100.0
	Semiskilled	1	0.9	25	67.6	11	29.7	37	100.0
	Skilled	36	75.0	12	25.0	–	–	48	100.0
	Professional	4	40.0	6	60.0	–	–	10	100.0
	Total	**108**	**27.0**	**193**	**48.3**	**99**	**24.7**	**400**	**100.0**
Pregnant	Housewives	40	23.5	72	42.4	58	34.1	170	100.0
	Unskilled	11	7.6	2	1.4	132	91.0	145	100.0
	Semiskilled	–	–	2	9.5	19	90.5	21	100.0
	Skilled	29	58.0	19	38.0	2	4.0	50	100.0
	Professional	6	42.9	8	57.1	–	–	14	100.0
	Total	**86**	**21.5**	**103**	**25.7**	**211**	**52.8**	**400**	**100.0**
Lactating	Housewives	32	18.3	48	27.4	95	54.3	175	100.0
	Unskilled	–	–	13	8.2	145	91.8	158	100.0
	Semiskilled	–	–	–	–	8	100.0	8	100.0
	Skilled	25	58.1	16	37.2	2	4.7	43	100.0
	Professional	11	68.8	5	31.2	–	–	16	100.0
	Total	**68**	**17.0**	**82**	**20.5**	**250**	**62.5**	**400**	**100.0**
Non-pregnant non-lactating	Housewives	35	18.9	82	44.3	68	36.8	185	100.0
	Unskilled	–	–	29	27.1	78	72.9	107	100.0
	Semiskilled	–	–	6	17.6	28	82.4	34	100.0
	Skilled	34	59.6	23	40.4	–	–	57	100.0
	Professional	12	70.6	5	29.4	–	–	17	100.0
	Total	**81**	**20.2**	**145**	**36.3**	**174**	**43.5**	**400**	**100.0**
Overall	**Housewives**	**172**	**24.8**	**272**	**39.0**	**252**	**36.2**	**696**	**100.0**
	Unskilled	**13**	**2.4**	**124**	**22.6**	**412**	**75.0**	**549**	**100.0**
	Semiskilled	**1**	**1.0**	**33**	**33.0**	**66**	**66.0**	**100**	**100.0**
	Skilled	**124**	**62.0**	**70**	**35.4**	**4**	**2.0**	**198**	**100.0**
	Professional	**33**	**57.9**	**24**	**42.1**	**–**	**–**	**57**	**100.0**
	Total	**343**	**21.4**	**523**	**32.7**	**734**	**45.9**	**1600**	**100.0**

p = .000 Sig.

While analyzing the nutritional knowledge of sample with respect to occupation it was seen that most nutritionally aware group of women was that of professionals. 100.0% women working as professional possessed good or fair nutritional knowledge, they were followed by skilled women (98.0%), housewives (63.8%) and semiskilled women respectively (34.0%). The least nutritionally aware group was that of women who were categorized as unskilled (25.0%).

Amongst pre-pregnant group it was seen that (100.0%) professional and skilled women were possessing good or fair nutritional knowledge, followed by housewives (71.4%) and unskilled women (59.0%) respectively. The least nutritionally aware group was that of women who were categorized as semiskilled (26.0%).

As far as pregnant women were concerned it was seen that 100.0% professional and 96.0% skilled women had good or fair nutritional knowledge. 65.9% housewives also had good and fair nutritional knowledge.

The percentage of women categorized as semiskilled and unskilled possessing good or fair nutritional knowledge was least and almost same (9.5% and 9.0% respectively.)

TABLE- 96: OVERALL ASSESSMENT OF NUTRITIONAL KNOWLEDGE OF WOMEN WITH RESPECT TO LITERACY STATUS

Physiological Status	Literacy Status	Overall Assessment of Nutritional Knowledge							
		Good		Fair		Poor		Total	
		No.	%age	No.	%age	No.	%age	No.	%age
Pre-Pregnant	*Illiterate*	–	–	81	57.4	60	42.6	141	100.0
	Literate	108	41.7	112	43.2	39	15.1	259	100.0
	Total	**108**	**27.0**	**193**	**48.3**	**99**	**24.7**	**400**	**100.0**
Pregnant	*Illiterate*	9	4.6	5	2.6	180	92.8	194	100.0
	Literate	77	37.4	98	47.6	31	15.0	206	100.0
	Total	**86**	**21.5**	**103**	**25.8**	**211**	**52.7**	**400**	**100.0**
Lactating	*Illiterate*	–	–	18	9.4	174	90.6	192	100.0
	Literate	68	32.7	64	30.8	76	36.5	208	100.0
	Total	**68**	**17.0**	**82**	**20.5**	**250**	**62.5**	**400**	**100.0**
Non-Pregnant Non-Lactating	*Illiterate*	–	–	49	27.5	129	72.5	178	100.0
	Literate	81	36.5	96	43.2	45	20.3	222	100.0
	Total	**81**	**20.2**	**145**	**36.3**	**174**	**43.5**	**400**	**100.0**
Overall	**Illiterate**	**9**	**1.3**	**153**	**21.7**	**543**	**77.0**	**705**	**100.0**
	Literate	**334**	**37.3**	**370**	**41.4**	**191**	**21.3**	**895**	**100.0**
	Total	**343**	**21.4**	**523**	**32.7**	**734**	**45.9**	**1600**	**100.0**

p = .000 (Sig.) at all levels.

It can be seen from above data that an overall percentage of women possessing good or fair nutritional knowledge was highest among literate (78.7%) women as compared to illiterate (23.0%).

The table also depicts that percentage of women possessing good or fair nutritional knowledge was almost same among literate pregnant (85.0%) and pre-pregnant women (84.9%) and they were considered nutritionally aware group. They were followed by 78.7% non-pregnant non-lactating literate women and lastly by 63.5% lactating literate mothers.

Discussion

Young women in the third world spend about three-fourths of their time of life in almost continuous state of pregnancy and lactation. The high energy and nutrient demand during pregnancy and lactation makes women to spend a large proportion of their reproductive life under possible nutritional stress. The combination of routine daily work and reproduction exerts substantial stress on women for many years in their lives. Repeated pregnancies and prolonged lactation often result in a physiological depletion and stress. On the one hand they have to meet the challenge of biological functions in child bearing and lactation plus child care, home production and farming. While on the other hand, they live with poor diets which fail to provide with their nutrient needs.(12)

Although as per the national figures our state ranks at a nutritionally better place than other states, yet, due to lot of recent socio-political and socio-economic changes in past decade it is likely that health of people in general and women in particular may have been affected. Therefore, the present study undertaken with the objective to know about nutritional status, nutritional knowledge and dietary habits of Kashmiri women in general with special reference to their physiological status is discussed in detail under following headings:-

1. General Characteristics.
2. Nutritional Assessment.
3. Dietary Habits
4. Nutritional Knowledge.
5. Impact of various factors on nutrient intake BMI, Special food consumption, Nutritional knowledge.

1. GENERAL CHARACTERISTICS

Overall mean age among studied women was 27.89 $\pm$ 6.33 years. There was a gradual increase in the mean age from pre-pregnant women to lactating women (23.6 $\pm$ 4.49 years to 28.31 $\pm$ 4.97 years)

with mean age at pregnancy being 25.09 $\pm$ 4.55 years. The findings indicate that our women do not get married too young. In fact national data of NFHS – 2 also indicates that (in many States) the mean age at marriage for girls has already moved into 19 years (in 1991) and many other States are very close to this.(118) Even our findings are close to some of local study findings that have shown that mean marriage age of Kashmiri women in Rural areas ranges between 17.22 $\pm$ 1.80 years to 25.5 $\pm$ 3.5 years and that of Urban Women ranges from 18.34 $\pm$ 1.16 – 22.82 $\pm$ 2.38 years (Kitab Sheeba Jan).(119) One of the study has also shown that a major chunk of women (82%) marry between the age of 20 – 35 years and only 18% marry between the age 15 – 20 years (Bulbul Farzana Nisar).(120)

99.0% women studied were Muslims and only 1.0% were non-Muslims. This was obviously because Kashmir Division in J&K State is Muslim dominated area. This is almost consistent with census report (census Deptt.), according to which 90.65% population residing in Srinagar area and upto 95.4% in District Budgam are Muslims.(121) These slight variations may be attributed to the fact that most of Non-Muslims have migrated from Kashmir region. 55.9% of our women were literate of which 11.5% were primary, 10.8% Matriculate, 20.0% Graduates and only 11.6% had technical education (professional knowledge or post graduates). The female literacy percentage correspond well with the reported figures obtained by Andrabi Farkhanda (2003).(122) However, these figures are slightly higher than the percentage literacy status of NFHS – 2 (1999) Jammu and Kashmir.(123) This can be due to the fact that present data belongs to District Srinagar which is totally urbanized and District Budgam which has a definite urban influence. These figures are still comparable to some of the figures from North India e.g. Himachal Pradesh and Punjab with female literacy rate (age group 15 – 49) as 63.4% and 61.2% respectively (NFHS – 2; 1998-99 India).(118)

The working Status of women showed that less than half (43.5%) of women were housewives and 52.9% were either semi-

skilled or skilled and hardly 3.6% were professionals, thereby showing that majority of women stay either indoors or remain engaged with semi-skilled or skilled professions. This is in contrast to the findings of Bulbul Farzana Nisar (2000) who has shown that only 34.0% women were working and rest of them were housewives.[120]

Only 13.7% women belonged to low socio-economic Status whereas 36.6% were in the lower-middle or upper-middle socio-economic class, surprisingly half of studied women (49.7%) belonged to high socio-economic status. These findings are not in conformity with findings of Kawoosa Yasmin (1985), who showed that majority of respondents (79.0%) belonged to upper-middle or lower-middle class rest belonged to high SES or lower SES class.[124] The differences are because of type of sample studied. Even the mean per-capita income per month was Rs. 2,210 $\pm$ 1,579 showing that the families were earning comparatively better living against usual average standard of Rs. 1,033.25 as per-capita income per month (Rs. 12,399 as per-capita income per year) at current prices (Directorate of Economics and Statistics J&K 2001-02).[121] The variations in per-capita income may be due to the fact that data for the study is pertaining to valley only. Majority (73..8%) of women belonged to joint families suggesting that joint family system still prevails in the valley. These findings are supported by various local studies (Bulbul Farzana, Quadri Sabiha, Hussain Shazia Inayat, Masoodi Zahida).[120,125,126,127] Even this could be one of the contributory factor for better socio-economic status leading to pooling together of Income resources.

Average median number of family members per family was seven and median number of children per women was two. These observations are almost consistent with findings of NFHS-2(1998-1999) which shows that mean number of children for women in J&K is 2.7. The slight variations may be attributed to the fact that data for the present study pertains to Kashmir Valley only.[118] It was also found that majority of women (58.5%) had 1-2 children whereas around one-third of mothers (31.8%) had 3 – 4 children and only

9.7% had more than four children. Thus indicating majority of women are aware about family planning practices. Study on multidimensional problems of women in Kashmir valley have also shown that 88.18% respondents were fully aware about the family planning Programmes even though most of them were illiterate and live in rural areas.[128] Contrary to our findings statewise breakup of figures on level of contraceptive acceptance has shown that J&K lacks behind with low contraceptive acceptance.[129]

Thus studied women comprised of a group which married at a proper age (man age 27.89±6.33 years), were better educated (55.9%), most of them working (56.5%) and almost half of them belonging to high socioeconomic status (49.7%), with per-capita income per month as Rs.2,210 ± 1579.73.8% of them were a part of joint family system and 58.5% having 1 – 2 children only.

2. NUTRITIONAL ASSESSMENT

2.1 Clinical Examination:

Clinical examination of women showed that about 15% women had thin built. A small percentage of women (12.6%) had hair and skin (8.3%) abnormalities. Hair abnormalities manifested either as lack of lustre or easy pluck-ability. In both of these findings protein deficiency may be one of the contributory factor. Hair abnormalities were highest in lactating women (16.0%), followed by pregnant (13.2%), non-pregnant non-lactating (12.5%) and pre-pregnant women (8.5%) respectively. The reason for this may be that in lactation the nutritional drain is at its peak as compared to other physiological conditions. The skin abnormalities were seen as diffused de-pigmentation of skin or presence of dry and scaly skin. Percentage of ladies with skin abnormalities were highest among pregnant group (11.0%). This percentage was almost same (8.7%, 8.0%) for lactating and non-pregnant non-lactating women, and least among pre-pregnant women (5.5%). Whether these findings are of nutritional nature or non-nutritional in origin is difficult to differentiate

and was beyond the scope of this study.

About half of studied ladies (52.0%) had pale conjunctiva indicative of anaemia. The percentage of women with clinical symptoms of anaemia being highest in pregnancy (66.2%), followed by lactation (54.2%). Almost half of (49.0%) non-pregnant non-lactating women and even upto one-third (38.5%) women during pre-pregnancy had also these symptoms. This suggests that occurrence of anaemia (as judged by pale conjunctiva) among women especially during pregnancy and lactation is quite high. Evaluation of nutritional deficiency symptoms reported by Leela M.Sai and Busi B R (1995) showed higher incidence of anaemia (1.0%) and angular stomatitis (6.0%) in women of all physiological status. This was even substantiated by giving weight-age to nutritional deficiency symptoms and expressing as mean scores which had shown that lactating women had higher mean scores (0.99) and in non-pregnant non-lactating the lowest (0.84).[44] The percentage of women suffering from anaemia in North Indian States of Haryana (47.0%), Rajasthan (48.5%), Bihar (63.4%) and Punjab (41.4%) was a common feature reported by Swaminathan Research foundation (2001).[130] Even WHO study (2001) has reported that in India upto 88.0% of pregnant and 74.0% of non-pregnant women are affected by anaemia.[131]

Majority of women had normal lips and teeth with about 5%-12% of them having symptoms suggestive of B-complex deficiency which manifested either in the form of angular stomatitis (4.3%) cheillosis (0.8%) Red raw tongue (11.9%) indicative of Riboflavin or Niacin deficiency. Percentage of women having B-complex deficiency were comparatively higher among lactating and pregnant women. 9.1% women presented deficiency symptoms suggestive of vitamin C deficiency (bleeding gums). Increased demand during physiological status (pregnancy and lactation) coupled with low intake of foods rich in B-Complex vitamins may be one of the reason for such symptoms. The present study has already shown low intake of animal foods, pulses, roots and tubers and citrus foods which are

important source of vitamin B-complex. Even though green leafy vegetables consumption was better; however, it had lot of seasonal variation which can be another reason for vitamin B–Complex or vitamin C deficiency. Both vitamin B-complex and vitamin C deficiency may also be related to poor nutritional knowledge of women in general and food losses especially due to cooking practices.

Maheswari K and Khader Vijaya (2000) in their study although showed no frank signs of thiamine deficiency among women in all groups, yet prevalence of Riboflavin deficiency symptoms was shown to be lower in lean season compared to peak season among women. Also prevalence of vitamin deficiency symptoms among women were very low (0.33%).(132) Prema (1989) reported an increase in B-complex deficiency in pregnant women with increasing gestational period and in lactating women with increasing period of lactation.(133)

Less than one-fourth (22.8%) women had either spoon shaped nails or had white spots on nails, a common sign suggestive of anaemia among women. Data from local study (Qaudri Sabiha) on nutritional status of female employees of an educational institution had shown 14.0% women with white spots over nails and another 18.0% with bleeding gums, 28.0%complaining of poor vision in dim-light, 6.0% with pale conjunctiva and 16.0% with easy pluck-ability of hair.(125) V Saxena et al in a study (2000) from Lucknow observed 36.7% iron deficiency anaemia, 16.7% vitamin C deficiency, 12.3% vitamin B deficiency and 2.0% with vitamin A deficiency according to various clinical signs and symptoms of vitamin and mineral deficiencies among 400 pregnant women.(10) The clinical examination thus has suggested symptoms and signs suggestive of anaemia as a common finding with occasional B-Complex deficiency which gets more prominent during pregnancy and lactation and continues during non-pregnant non-lactating status.

2.2 Anthropometric Measurements:-

Overall mean body weight of women was 53.89 $\pm$ 8.53 kgs.

Present findings also showed that there was significant variation in the mean body weight of women in different physiological status. Mean body weight was lowest in pre-pregnant stage (51.10 $\pm$ 6.42 Kgs). There was not much difference in the mean body weight of lactating (52.88 $\pm$ 9.16 Kgs) and non-pregnant non-lactating women (53.89 $\pm$ 8.53 Kgs). The mean weight during pregnancy as expected was high (56.72 $\pm$ 8.48 Kgs) compared to pre-pregnant status. This is mainly attributable to growth of foetus and various physiological changes in women during pregnancy. However low weight gain of 5 – 6 Kgs in the studied women is because most of the mothers have been included only upto their second trimester of pregnancy where as major weight gain occurs during third trimester. Better mean weight among women during lactation compared to pre-pregnant status can again be explained on various physiological changes taking place during lactation and child birth. These changes are compensatory for lactational process. These findings are consistent with the weight changes of women in different physiological states. Leela Sai and Busi B R (1995) reported that lactating women had lower weights than the pregnant women and non-pregnant non-lactating women. The mean weight amongst pregnant women was 48.4 $\pm$ 7.75 kgs, amongst lactating women 41.9 $\pm$ 6.41 kgs and among non-pregnant non-lactating state being 48.5 $\pm$ 10.37 kgs.[(44)] Srivastava et al (1998) in his study on rural women in reproductive age showed that around 50.0% of rural women in pre-pregnancy state were under-nourished, with majority of women in reproductive age weighing 47 – 48 kgs, and 74.2% having weight < 45 kgs.[(43)]

The mean height of women in the present study was 155.70 $\pm$ 7.34 cms. There was insignificant difference ($p = .331$) in heights among women in different physiological Status. Thus confirming the fact that height is independent of physiological status after it has already attained particular potential. Although NFHS – 2 (1999) data shows mean height of 154 cms among women of J&K,[(118)] the slight variation with present data can be attributable to the fact that our

findings are limited to Kashmir region only. Sai Leela M and Busi B R (1995) also observed the mean height (cms) of women in different physiological status as 149.90 cms among pregnant group, 149.1 $\pm$ 5.81 among lactating group and 150.7 $\pm$ 5.59 among non-pregnant non-lactating group. Clearly showing that there is not much difference in heights of women during different physiological status.(44) Srivastava et al (1998) had also shown the mean height range among pregnant ladies ranged between 148 – 150 cms and only 13.5% were < 145 cms.(43)

As per present study mean BMI of women was 22.534 $\pm$ 3.4219, whereas NFHS – 2 data reported mean BMI of women in J&K as 21.(118)

69.3% of women were designated as normal as per classification of BMI and 30.7% of women had malnutrition of varying degrees. The BMI values in most of North Indian States had shown that one out of three women (33%) aged 15 – 49 years is under-nourished and this is wide spread among women in population groups of less educational status and even this percentage goes upto 40% (two out of five) in States like West Bengal and Maharashtra.(134) Saxena et al (2000) had shown that 23.3% pregnant women were having BMI less than 18.5 where as majority of pregnant women (72.5%) were having BMI in the range of 18.5 – 25.(10)

Mean BMI of pregnant (23.27 $\pm$ 3.58 kg/m^2) and non-pregnant non-lactating women (22.667 $\pm$ 3.45kg/m^2) was towards higher side in comparison to pre-pregnant (21.22 $\pm$ 2.77 kg/m^2) and lactating women 21.83 $\pm$ 3.45 kgs/m^2). These findings are consistent with findings of a study carried out on Himalayan Women by Pant B.R. (2004) where it was found that mean BMI of pregnant women was highest 19.66, that of lactating women was 18.89, whereas it was 19.24 for women of general category.(135) The overall percentage of women with BMI below 18.5 kg/m^2 was 10.9% and it ranged between 11.5% in non-pregnant non-lactating women to 13.5% in lactating women thus showing that it is slightly lower to 16.8% as shown by

J&K NFHS – 2 data (1999). These figures are definitely better than national percentages (35.8%) NFHS – 2 on all India basis but comparable to north Indian figures (16.9%).[118]

3.3 Nutrient Intake of women :-

2.3.1 Calories: Overall mean calorie intake of women was 1967.07 $\pm$ 366.85 kcal with almost one-fourth of women having absolutely no calorie deficit and just over two-third of them having varying percentages of calorie deficit in comparison to recommended dietary allowances and 45.9% having only upto 20% deficit. The mean calorie intake (1801.24 $\pm$ 279.75 kcal) was lowest among pregnant women and obviously the percentage of women with calórie deficit was also highest (94%) among pregnant group as was the percentage calorie deficit in comparison to RDA (between 20%-40%) in about 30.0%. The number of women with percentage deficit during pregnancy being higher than women of other groups may be related to lower intake of foods by pregnant women due to nausea, vomiting etc. which are common features in pregnancy. It may be also attributed to women's (11.3%) dislike towards rice (a major source of calories in their diet) during pregnancy in comparison to other physiological states. Mean calorie intake was better in lactating women (2366.99 $\pm$ 401.99 kcal) and percentage of women with calorie deficit between 20% - 40% was almost half (15.7%) than in pregnancy (30.0%). It may be explained on the basis that a good percentage (89.5%) of women were consuming special foods during lactation i.e. dry fruits (12.0%), desserts and sweets (11.2%), Ghee/Butter (10.1%) and kitchrie (porridge) by 15.4%, all of which are calorie rich foods.

Although mean calorie intake of pre-pregnant and non-pregnan non-lactating women was almost same (1856.38 $\pm$ 185.36 Kcal an 1843.68 $\pm$222.64 Kcal respectively). Yet, the percentage of wome in pre-pregnancy state with 20% - 40% calorie deficit was high (17.5%) in comparison to non-pregnant non lactating state (10.5% This is attributable to restricting of calories or foods in general durig pre-pregnancy stage to maintain body shapes and avoid overweight

as has been reported by Glory Tabasum (1995) while studying food habits among adult students. 50.0% of female adult students were found to be observing diet control and among them 90.0% were doing it just for maintaining their physical structure.[136]

2.3.2 Proteins: Overall mean protein intake of women as per 24 hour recall was 51.07 ± 12.79 gms with almost one-fourth of them (23.7%) having no protein deficit. Around three-fourth (76.3%) of women studied were having varying degrees of protein deficit of which 41.7% were having only upto 20.0% protein deficit per day as per recommended dietary allowances. The mean protein intake variations among women in different physiological status is almost similar with mean calorie intake variations being highest during lactation (63.91 ± 11.40 gms). Mean protein intake of pregnant and non-pregnant non-lactating women was almost same being 45.72 ± 11.78 gms and 45.15 ± 8.62 gms respectively which was lowest intake as compared to other physiological status. However the percentage of women with protein deficit was highest amongst pregnant group (94.3%) with most of them (34.5%) having more than 40% deficit and 32.0% having between 20% - 40% deficit. The reasons can be multiple such as dislike (12%) towards meat, food taboos like avoiding consumption of fish and curds together (88.6%), milk and fish together (79.7%). Similarly egg and milk the taboo followed by 12.0% pregnant women was thought to be hard to digest. The percentage of women with protein deficit between 20%-40% was lesser in lactation (26.0%) than in pregnant women (32.0%). It may be related to consumption of protein rich foods used as special foods by women during lactation like meat/organ meat (18.2%), milk and milk products (15.1%) and fish (10.1%).

'Mean protein intake among pre-pregnant women (49.49 ± 8.98 gms) was slightly better in comparison to non-pregnant non-lactating women (45.15 ± 8.62 gms) and the percentage of pre-pregnant women with protein deficit ranging between 20% - 40% was also better (13.5%) in comparison to non-pregnant non-lactating

group 26.5%.

2.3.3. Iron: Overall mean dietary iron intake of women was low (11.0845 ± 5.8626 mgs) as against recommended dietary allowances. Mean iron intake among women of different physiological status varied appreciably being lowest in pregnancy (8.305 ± 2.4615 mgs) and non-pregnant non-lactating status (8.5124 ± 2.2517 mgs). Similarly mean dieatary intake of lactating women (16.8952 ± 8.5745 mgs) and those in pre-pregnant stage (10.6252 ± 2.1562 mgs) was comparatively better. Percentage deficit of dietary iron intake in comparison to recommended dietary allowances showed deficit of 40% or more (iron intake) during pregnancy than lactation which is not only related to poor intake of iron rich foods (like green leafy vegetables) throughout the year because of non-availability, variations in dietary habits and consumption due to complications like nausea, vomiting etc. but also due to poor knowledge of these women regarding sources and functions of nutrients.

2.3.4. Calcium: Overall mean dietary calcium intake of women was 434.72 ± 265.56 mgs (ranging between 75 mgs – 1684 mgs). The mean calcium intake was lowest among non-pregnant non-lactating women (371.38 ± 180.95 mgs) and highest amongst women of lactating status (543.60 ± 337.91 mgs). There was not much difference in mean calcium intake among pre-pregnant and pregnant state. More than three-fourth (78.2%) women had dietary calcium deficit of varying degrees. Although just less than half of the total studied women had > 40% calcium deficit; yet, the percentages were higher among women belonging to pregnant group (72.7%), followed by lactating women (67.0%). The lower calcium intake by women can be related to maximum percentage of women (71.3%) not including milk and milk products (which is a major source of calcium) in their daily diet or to poor nutritional knowledge of women regarding sources and functions of nutrients.

While comparing the nutrient intake of studied women with recommended dietary allowances for different physiological

conditions it was found that women consumed all the nutrients in lesser quantities in general especially iron was worst hit nutrient followed by calcium, calories and proteins respectively. Various studies have shown similar findings of lower intakes of calories, proteins and iron during pregnancy which becomes better during lactation but still remains lower to non-pregnant non-lactating status (Murty K. V. S Reddy Janardhan K).[137] Longitudinal studies on nutrient intake of pregnant women as reported by Reddy N. S, Sahans, M. J and Pande (1994) showed that intake of calories, proteins, calcium and iron by the pregnant women in all trimesters was far below recommended dietary value.[138]

3. DIETARY HABITS

3.1 Nature of diet and food frequency:

Consumption of variety of foods in adequate quantity is essential for balanced dietary pattern in general and modification during different physiological status makes it suitable to these conditions. To get an idea of dietary habits and pattern in our women the present study reveals that only a negligible percentage of women were vegetarian and rest of them were non-vegetarian. Rice (cereal) was universally consumed by women irrespective of their physiological status. 98.3% women eat some green leafy vegetables on daily basis. Roots and tubers were mainly consumed by (81.3%) women on weekly basis and percentage consumption was comparatively better during pregnancy and non-pregnant non-lactating state. Frequency of eating pulses was mostly (92.5%) occasional among women. Percentage consumption of pulses once or twice was negligible, however among pregnant (11.7%) and lactating (7.5%) women it was better. Almost half (46.2%) of studied women include meat / poultry consumption (4 – 5 times / week) was more among pregnant (28.5%) followed by pre-pregnant group (23.1%). This frequency was almost same among lactating and non-pregnant non-lactating women. More than half (56.4%) of studied women consumed milk / curd

occasionally, however, milk / curd was mostly consumed by lactating (37.4%) and pregnant women (31.0%) on daily basis. There was again not much difference in the percentage of women consuming milk on daily basis belonging to other two physiological groups (pre-pregnant, non-pregnant non-lactating).

NFHS – 2 (1999) data J&K showed upto 51% of women consuming green leafy vegetables on daily basis and only 31% consuming other vegetables. Whereas upto 88.0% mothers consuming vegetables on weekly basis. The most of findings are consistent with present study.[118]

The universal consumption of cereals and green leafy vegetables on daily basis by women in general, with addition of roots and tubers on weekly basis pulses on fortnight or monthly basis and animal foods on weekly or fortnightly basis makes our women's food quantitatively low especially in calories, proteins and to some extent in vitamins.. Even minerals (Calcium, Iron) or some vitamins (Vitamin C, Vitamin B) could be worse affected.

3.2. Meal pattern and foods consumed for various meals:

More than half (62.4%) of women followed four meal pattern, however around one-third women (33.6%) ate five times a day. The percentage of women with four meal pattern was highest among pregnant group (80.3%). Whereas five meal pattern was mostly followed by women in lactating State (40.0%) and non-pregnant non-lactating state (44.8%). While four meal pattern of Breakfast, lunch, afternoon tea and dinner was predominately (universally) followed; no additional quantity is seen in pregnancy and lactation.

Salt tea with bread (Tandori Roti) is common breakfast item. Only one fifth of mothers add milk during pregnancy and about 20% add egg in pregnancy and lactation. Rice and green leafy vegetables being a common lunch item with curds / milk as additional item in lunch. Meat / poultry are not daily items and so are not the pulses,

eggs, milk and fruits. The combination of food stuffs and meal pattern does show that a definite percentage of mothers are likely to suffer some quantitative deficiency from calorie and protein intake. Even no attempt is being made by our mothers for compensating foods rich in minerals especially iron or calcium during the pregnancy / lactation. Similar findings were observed in J&K NFHS – 2 data (1999) where milk / curd was a common part of diet for majority of women (52%), however occasionally, and only 15% consumed fruits daily. Similarly 44% eat meat / fish / poultry occasionally and one-third weekly.[118]

3.3 Likes and dislikes:

There is a vast variation in the likes and dislikes of various food items in general and particularly in different physiological status. Amongst cereals wheat was hardly liked by (0.9%) ladies and rice was more liked during lactation and pre-pregnancy compared to pregnant and non-pregnant non-lactating status. Although legumes and pulses were liked by only one-fourth (26.7%) of women as already discussed, it was interesting to note that the pulses were more frequently liked in pre-pregnant and pregnant status than the other two physiological status. Similarly amongst milk and milk products curds was liked by 50.0% women that too during pregnant and lactating states. The most liked animal food was poultry followed by meat and during pregnancy the liking for both was low whereas it was better during non-pregnant non-lactating state followed by pre-pregnant state.

One-third of women liked green leafy vegetables; however, during pregnancy spinach and sag was more frequently liked and the variation in the liking of green leafy vegetables was not much between different physiological status.

Only one-fourth of women liked fruits especially apples and citrus fruits than the dry fruits. Liking for fruits was much better during pregnant and lactating state than the other two physiological

states.

The common dislikes about the foods were on some of the cereals, green leafy vegetables, animal foods, sweets and other miscellaneous foods. During pregnancy 11.3% women had dislike for rice and 12.0% for meat whereas about half of pregnant women (48.0%) didn't liked Knol Khol (green leafy vegetables) and about more than half mothers (57.2%) didn't liked sweets during pregnancy.

It is obvious from the above pattern that there is enormous variation in food likes and dislikes among women in general especially during various physiological status which may be resultant of cultural factors, social influences or relative availability of food items that has determined the overall consumption pattern in women.

As can be seen our routine dietary pattern among women is of rice and green leafy vegetables as a main staple food for lunch and dinners and Namkeen tea with bread (Tandoori Roti) as common breakfast item and evening snack. Milk / Curd is an additional item. However roots / tubers, pulses, fruits are occasional foods and so are animal foods especially meat / poultry / eggs. There is limited change in food pattern during pregnancy and lactation and this is likely to be because of likes / dislikes or cultural influences rather than based on the knowledge of definite increased requirements and demands.

3.4 Seasonal Variation:

Consumption pattern of vegetables during different seasons also varied. During summers mostly seasonal vegetables like Sag (Brussel Sprouts) and Knol Khol greens were consumed (50.0%) by women. Rabbanie (1981) reported that Kashmiri take plenty of vegetables but their favorite dish is the Hak (Sag) or Krama Sag.[139] Lisa (Rumex), Noonar (Portulaca) and Hand (Garden Cress) which grow as wild grasses were also consumed during summer season. Only half of studied women included all seasonal vegetables viz cauliflower, cabbage, lady finger, spinach, sag, knol khol greens, cucumber etc in their diet. A diet survey carried out by State Nutrition Organization

(1978) also depicted that the vegetables such as cabbage, spinach, sag, cucumbers, turnip,, radish are extensively used by Kashmiris.(140)

However during winter season legumes and pulses (92.3%), dried vegetables (58.6%), roots and tubers (73.7%) and Quince apples / lotus stems (21.4%) were mostly consumed. This difference in the consumption pattern of vegetables is attributed to seasonal availability and Kashmir Valley being a hilly area mostly remaines covered by Snow during winters and most often remains cut off from its winter capital Jammu, so people have to depend on semi-perishable, non-perishable and preserved foods i.e. legumes and pulses, roots and tubers and dried vegetables. Studies carried out by Bomzai P.K. (1962); Lawrence Welter R (1967) and State Nutrition Organization also revealed that dried especially tomatoes, turnips, pumpkins were dried vegetables, fruits of all sorts and reserved for the loan months of winter. They also reported that dried vegetables as well as various kinds of pulses were taken by Kashmiris during the winter. But pulses were not considered of much importance of by them.(140,141,142)

3.5 Special food consumption (Pregnancy / Lactation):

Collectively just over two-third of (69.3%) studied women were consuming special foods during pregnancy / lactation). However these special foods were preferably consumed in lactation than in pregnancy. The commonly consumed special foods during lactation were garden cress (30.4%) meat and organ meat (18.2%), milk and milk products (15.1%), fish (10.1%) and fruit juices (5.9%). The beliefs for such consumption were increase in haemoglobin content by use of organ meat / garden cress, increase in milk production with satiety to the child through mothers milk by consuming fish.

Pregnant women were found to consume mostly fruit juices (29.1%), milk and milk products (17.3%) and dry fruits (13.8%) as special foods.. Pregnant women were even found to consume Gum Arabica (12.8%) soaked in milk or water, Quince Seeds (4.3%) soaked

in water and sharbats (home made extracts of raisins and apricots) (9.2%), as these foods were believed to be of help in delivering a child normally without complications. Mirza Raj Kumari (1985) also found out that the special foods consumed during pregnancy by Kashmiri Women (Budgam Tehsil) include Quince Seed in water, fruit juice and butter.[143] Although various other studies have also shown consumption of special foods in pregnancy and lactation, yet lot of contradiction on use of special foods during pregnancy and lactation and their impact or reason for consuming such foods can be seen {Leela M. Sai / Busi B. R. (1995), Surekha R. (1984); Pendse V / Giri I. (1989)}.[44,144,145]

3.6 Food Taboos:

The most common food taboos generally followed were avoiding combination of fish and curds (67.9%), fish and milk (64.4%), Dal and curds (27.4%) or discarding cooking water of Spinach (22.0%). Among pregnant women common food taboos were avoiding fish and curds or milk together. Specific food taboos during post-partum period (40 days after delivery) was avoidance of consumption of fresh fruits and vegetables and excessive intake of fish.

Likely nutritional impact of such restrictions or avoidance can lead to low calcium, vitamin and to some extent protein intake. Which otherwise is required in higher quantity during these physiological conditions and thus further adding to overall percentage deficit of these nutrients.

Avoidance of consumption of Fish and Curds or milk was considered to be cause of leukoderma to women as well as to the growing foetus. Consumption of curds and dal was associated with indigestion and flatulence. Intake of cooking water of spinach was thought to be the cause of frequent urine infections and formation of kidney stones. Fresh fruit and vegetables during post-partum was related to cold and coughs to the infant and excessive intake of fish during same period was considered to be helpful in the process of

lactation, and provide satiety to the infant through mother's milk. Avoidance of these foods is essentially a cultural practice and hence consumption is considered a taboo. A Study carried out by Mirza Raj Kumari (1985) on food habits of families in Budgam Tehsil (Kashmir) also showed that majority of families believed on different food taboos especially on consumption of fish and milk,, fish and curds, curds and dal or egg, and milk in combination.(143)

The dietary pattern of the women covered by the present study revealed that it was largely dependent on their habitual types and food items locally available. The food habits of Kashmiri women are also related to seasonal variations that control the availability of food materials.

4. NUTRITIONAL KNOWLEDGE

4.1. Overall Nutritional Knowledge:

Around half of studied women in general had poor overall nutritional knowledge and hardly one fifth (21.4%) of them possessed good overall knowledge. Percentage of women with poor overall knowledge continued throughout pregnancy and lactation. Thus showing that women don't try to improve their nutritional knowledge in general even in these important physiological status when it is absolutely necessary.

4.2. Specific nutritional knowledge:

The present study showed that just over half of women (53.8%) had poor knowledge regarding sources and functions of nutrients as well as nutrient losses during cooking and this percentage was much higher during pregnancy and lactation. However, nutritional knowledge with regard to nutritional requirements was comparatively better among women in general (32.7%) with only 29.1% having poor knowledge. Surprisingly the percentage of pregnant and lactating women with poor knowledge regarding nutritional requirements

remained lowest. This leads us to believe that mothers do possess better idea about nutritional requirements however they are ignorant as to how or where from these nutrients can be provided (sources) and what is their role (functions), unfortunately our mothers also don't have the concept of nutritional losses during cooking. This makes a strong case for nutritional counselling and nutritional education in general with focus on certain special areas of nutritional knowledge in women. A study carried out by Koul Anjana (1989) on nutritional knowledge of teachers and students of two colleges in Srinagar showed that respondents obtained highest mean scores (73%) for "nutritional needs" and the lowest mean scores (53%) for functions of nutrients". The significant difference in the study mentioned indicated that respondents had maximum knowledge about nutritional needs during different periods like infancy, pregnancy, adolescence and old age and they had minimum knowledge about functions of nutrients.[146] Bisati Sabia (1999) reported that house boat women in Srinagar City do not have any knowledge regarding the loss of nutrients while cooking foods.[147]

5. IMPACT OF VARIOUS FACTORS ON:

5.1 Nutrient Intake

5.2 BMI

5.3 Special Food Consumption

5.4 Nutritional Knowledge

5.1 Nutrient Intake:

5.1.1 Calorie: Mean calorie Intake of women in the age group ≤ 20 years was lowest in general in the age group 21 – 30 years and > 30 years was better. Advancing age showed increased intake of calories among pregnant women. Similar observations were persistant among pre-pregnant and non-pregnant non-lactating women. Lactating group gave a contrary picture i.e. calorie intake decreased with increasing age. The inter-group variations were insignificant. Overall percentage

of women with below normal calorie intake was highest (90.6%) among the women ≤ 20 years of age. This was true for pre-pregnant, pregnant and non-pregnant non-lactating group of women also.. The only exception to this being lactating women showing percentage of women in the age group > 30 years with below normal calorie intake as highest. With advancing age, a decrease in percentage of women with normal calorie intake per day in general as well as with different physiological group was observed. Thus it can be inferred that women in younger group are at a disadvantage of consuming low intake of calories which is even carried to physiological status, a trend that needs further evaluation.

Although there was almost no difference in mean calorie intake of women in general or in different physiological groups belonging to joint / nuclear families and in the percentage of women with normal or below normal calorie intake living in joint nuclear families; yet, some effect of living in joint family system could be seen in different physiological status such as women living in nuclear families with normal calorie intake being higher (45.9%) than those living in joint families (23.4%). Whereas percentage of lactating mothers with normal calorie intake being higher (36.8%) in joint families in comparison to those living in nuclear families (18.8%). This may be due to the fact that in nuclear families there is an advantage of non-sharing of foods and cultural belief of "feeding two" during lactation playing the advantageous role for lactating mothers (in joint families).

In general mean calorie intake of women belonging to different socio-economic class was not consistent and showed lot of variations. During pre-pregnancy mean calorie intake of women belonging to low, upper-middle and high socio-economic class did not show much variation. Although pre-pregnant ladies belonging to low socio-economic class had slightly higher mean calorie intake, however, the differences were statistically insignificant ($p = .029$). Mean calorie intake of pregnant women increased as the socio-economic status went up; whereas reverse was true for non-pregnant non-lactating

women i.e. as socio-economic status came down mean calorie intake decreased. However these differences were statistically significant (p= .000 in both cases). Interestingly looking at percentage of women with normal or below normal calorie intake / day in general and in different physiological groups it was clear that percentage of mothers with below normal calorie intake / day in general or in different physiological groups did drop with increase in socio-economic class. This may be due to the fact that our socio-economic classification has taken income only into consideration (whereas in any socio-economic classification there are usually other variables like education, occupation etc. which are considered together). It can be therefore said that although food is a purchasable commodity and quantity is dependent on purchasing power. Yet other factors must be playing major role in deciding the quantitative and qualitative intake and consumption of foods.

Overall mean calorie intake / day was significantly better among housewives, professionals followed by unskilled group. This pattern was followed in pre-pregnancy and non-pregnant non-lactating states. But during pregnancy and lactation there was total reversal of this pattern.

Percentage of women below normal calorie intake / day (against RDA) was maximum in unskilled and semi-skilled and lowest in professionals. These findings were consistently observed in all other physiological groups except lactation. Even though some of the findings did show statistical significance, yet, inconsistent nature of the findings makes us to believe that there is no definite pattern of relationship between occupation and calorie intake.

Percentage of women with different calorie intake per day and their percentage with normal calorie intake was highest among literate women in general as well as in different physiological groups which may be attributed to overall knowledge and understanding of nutritional requirements and intakes.

5.1.2. Proteins: Age again showed variations in the mean protein

intake of women being highest in the age group 21 – 30 years, followed by above 30 years age group and lowest in ≤ 20 years age. During pre-pregnant, pregnant and lactating status it was seen that with increase in age there is an increase in mean protein intake. The only exception to this was women of non-pregnant non-lactating status where highest mean protein intake was found in the age group 21 – 30 years, followed by > 30 years age group.

Similarly greater percentage of women with below normal protein Intake per day (as compared to RDA) were in the age group ≤ 20 years and with increase in age this percentage dropped down significantly. This trend was also seen in different physiological status (pregnancy and lactation), except in non-pregnant non-lactating group after > 30 years age group. This is explainable since we know that younger women have lesser requirement of proteins as per their body weight and increase in age (increases overall weight) brings more maturity and development and thus greater protein requirement.

Negligible difference in the mean dietary protein intake and percentage of women with normal protein intake per day among joint and nuclear families shows that type of families don't determine protein intake. Yet greater proportion of women in pre-pregnant group in nuclear families having higher percentage of mothers with normal protein intake compared to joint families shows non-sharing effect of food intake. Similarly, percentage of women with normal protein intake being higher for lactating women in joint families compared to those in nuclear families may be an expression of cultural factors giving due regard to "feeding two" (mother and baby) concept in a family.

In general, as well as women in various physiological status except non-pregnant non-lactating group, the mean protein intake and percentage of women with normal protein intake was highest among professional women followed by skilled group and housewives. Better mean protein intake of professional group and percentage of normals (women with normal protein intake) per day

is explainable on the hypothesis of greater purchasing capacity or literacy status and nutritional knowledge in this group. As far as skilled group is concerned it may be related to their economic independence. However in case of housewives comparatively better protein intake may be attributable to their sedentary life style which subjects them to increased consumption (intake) while watching television or entertaining guests. The non-pregnant non-lactating group being exception to this rule.

There were significant differences in overall mean protein intake of women belonging to different socio-economic status. Women of the high socio-economic group had highest mean protein intake in all categories and those who belonged to low socio-economic class had lowest mean protein intake in all groups. It may be related to low purchasing power of rich protein food of animal origin by women of this class or less consumption of legumes and pulses by women (which is a major source of protein also) or to their poor nutritional knowledge to include cheaper sources of proteins in their diet.

Higher percentage of women with normal protein intake belonged to high socio-economic class in all physiological categories with increase in socio-economic class there was a consistent increase in percentage of mothers consuming normal protein intake. Percentage of women with normal protein intake was highest (62.5%) among pre-pregnant category. It was 51.7% in non-pregnant non-lactating group, 24.8% in lactating women and dropped down to 10.9% in case of pregnant women. As mentioned similar explanation based on qualitative improvement in protein rich foods due to economic reasons can be offered.

Mean protein intake and percentage of women with normal protein intake was higher among literate women compared to illiterate women. Mean protein intake and percentage of mothers with normal protein intake in all physiological status followed the above mentioned pattern. The difference between literate and illiterate groups were statistically significant ($p = .000$) also. Thus the literacy status

significantly has an impact on both qualitative and quantitative intake of mothers. This can be attributed to better knowledge and positive attitudes towards various protein rich foods.

5.1.3. Iron: Influence of age was not seen on mean dietary iron intake or percentage of women with normal or below normal iron intake (compared to RDA) in general or in pre-pregnant, pregnant and non-pregnant non-lactating categories. However during lactation it was seen that women in the age group 21 – 30 years and > 30 years had insignificantly higher mean daily dietary iron intake although still lower to RDA at that level. Thus age had not much influence on dietary iron intake and observed difference in lactation can be simply influence of confounding factors.

Mean dietary Iron intake / day of women living in nuclear and joint families showed minimal variations among pre-pregnant, pregnant and non-pregnant non-lactating women. Also an insignificant difference ($p = .474$) in percentage of women with normal dietary iron intake per day living in joint and nuclear families was observed, indicating that type of family as such had no impact on percentage of women with normal / below normal dietary iron intake.

Although professional women had higher mean iron intake per day (but lower to RDA), yet this trend was not seen in women in different physiological status. Housewives, professional women had almost same mean daily dietary Iron intake. Thus indicating that occupation as such does not influence dietary iron intake of women.

Women belonging to high socio-economic class had slightly better iron intake per day as compared to other classes but these intakes were still less as compared to RDA. These findings were almost consistent among women of all physiological status. Pregnant women belonging to upper-middle class had insignificant higher mean dietary Iron intake per day as compared to those who belonged to high socio-economic class. It can be inferred that foods consumed by women in high socio-economic class especially of animal nature as already discussed may be contributing to better source of iron intake in diet.

Mean dietary iron intake of women in general and all physiological status was more among literate women as compared to illiterate women which may again be related to nutritional knowledge of literate women.

5.2 BMI (Body Mass Index):

Degree of malnutrition as assessed by Body Mass Index in relation to various determinants showed that age significantly affected the nutritional status. While percentage of women with varying degree of malnutrition was high in young age group ($\leq$ 20 years) there was a substantive drop in this percentage with advancing age. This trend was even evident among different physiological age groups except among non-pregnant non-lactating group. This can be because young women are still growing and trying to catch up with the optimal potential and their requirements of nutrients don't match with the intake especially calories. Worsening of this effect in pregnancy and lactation is self explanatory (more demands, more deprivation and thus more impact).

A significantly ($p = .000$) evident difference in percentage of mothers between literate and illiterate groups was seen in this study. Women of literate group had higher percentage of normal mothers (38.3%) as compared to illiterate group (31.1%). But more evident difference was among the percentage of malnourished women in literate group (3.5%) which was almost half the percentage compared to illiterate group (7.4%). Similar trend was seen in different physiological groups. This may be related to better energy intake among literate women observed in this study compared to illiterate women, even the nutritional knowledge was better among literate group in the present study.

Degree of malnutrition among mothers showed percentage of normal women (as per BMI) highest in joint families as compared to those in nuclear families. Similarly during pregnant status the percentage of women classified as normal (as per BMI) was again

slightly higher among women of joint families (70.9%) as compared to those in nuclear families (65.6%). These percentages were almost same for pre-pregnant women living in nuclear / joint families. Whereas among lactating and non-pregnant non-lactating groups it was high among nuclear families compared to those in joint families. These variations are statistically insignificant ($p = .235$) and can be attributed to effect to confounding factor or sample size variation with each group.

There was insignificant ($p = .401$) relationship between occupation and BMI, thereby suggesting type of occupation has no effect on BMI of women.

5.3 Special Food Consumption:

Percentage of women consuming special foods was highest among the age group 21 – 30 years, followed by mothers in the age group >30 years and lowest among mothers ≤ 20 years of age. Same trend was up held by women during both physiological conditions (pregnancy / lactation).

Type of family, socio-economic status showed better intake of special goods among women in joint family and high socio-economic classes (with similar observation in pregnancy as well as lactation). This can be attributed to factors like cultural practices and respect (social status) given to women in different physiological status or ability of families to purchase and spend on special foods.

Special food consumption of women has no consistency in different occupation and consumption varied in pregnancy, lactation or overall group. Thus making it clear that occupation does not have any impact on consumption of special foods during pregnancy /

lactation.

Special foods were mostly consumed by literate women in general (56.7%). During pregnancy around three-fourth literate women (73.0%) consumed special foods; where-as, during lactation it was seen that there was not much difference in the percentage of literate and illiterate women consuming special foods (47.8% and 52.2% respectively). It points towards the fact that although during pregnancy literacy may be playing a vital role in consumption of special foods but during lactation it is not having any impact. It may even be related to cravings (PICA) of literate pregnant women that they include special foods in their diet.

5.4. Nutritional Knowledge:

Overall women possessing good or fair nutritional knowledge belonged to high socio-economic class. The lower the socio-economic class the lowest was the percentage of women with good or fair nutritional knowledge. Suggesting that socio-economic status does have a bearing on nutritional knowledge of women which may be related to exposure or access of women of this class to media, literature, social interactions in restaurants, parties etc. Highest percentage of women in upper socio-economic class possessing good nutritional knowledge was among pregnant women followed by pre-pregnant, non-pregnant non-lactating and lastly lactating women.

Theoretically better the occupation better the acquisition of knowledge and understanding. Which was depicted by the findings of present study also i.e., professional women in general as well as in different physiological status were cent-percent nutritionally aware. Which may be related to social interaction and educational

qualification of this group.

Literate women of all physiological groups had edge over illiterate women as far as their nutritional knowledge was concerned. Thereby clearly showing that literacy status has direct relationship with acquiring nutritional knowledge. Similar findings have been reported by Jelso et al (1965) showing a direct relationship between income and nutritional practices and occupation.[148] Sim S L (1976) found a direct relationship existing between nutritional knowledge and occupation. Higher occupational groups had better knowledge of nutrition than the lower occupational groups.[149]

Chapter V
(Summary and Conclusion)
SUMMARY

The present study is a cross sectional study which has been carried over a period of two and a half years covering urban as well rural women with the aim to obtain empirical information about "Nutritional Status and Dietary Habits of Kashmiri Women". A sample of 1600 women (800 Rural and 800 Urban women) was selected. Data on nutritional status was collected through clinical assessment schedule and nutritional anthropometry (height, weight, body-mass index). It was further supplemented by assessing dietary intake using 24 hour recall method. For assessing dietary habits and nutritional knowledge, information was gathered through a pre-formed questionnaire. The nutritional knowledge has been quantified using scoring method. The main findings of the study have been summarized under four main headings.

A. General Characteristics.

B. Nutritional Assessment.

C. Dietary Habits.

D. Nutritional Knowledge.

A. GENERAL CHARACTERISTICS

Overall mean age among studied women was 27.89 ± 6.33 years. Mean age of pre-pregnant women was 23.6 ± 4.49 years, for pregnant women it was 25.09 ± 4.55 years, that of lactating women was 28.31 ± 4.97 years, whereas for non-pregnant non-lactating it was 34.50 ± 5.01 years. Studied women were mostly (99.0%) Muslims with 44.1% women being illiterate and 55.9% literate of which 11.5% were primary, 10.8% matriculate, 20.0% graduates and 11.6% had technical education (professionals and post-graduates). Majority of women (52.9%) were either semi-skilled or skilled and about 43.5% were housewives. 13.7% women belonged to low socio-economic status, 36.6% were in lower-middle or upper-middle socio-economic class and 49.7% belonged to high socio-economic class. Mean per-capita income per month of women was Rs. 2,210 ± 1579. Three-fourth women were living in joint families and 26.2% lived in nuclear

families. Average median number of family members per family was seven and median number of children per woman was two. 58.5% women had 1- 2 children, 31.8% had 3- 4 children and 9.7% had more than four children.

B. Nutritional Assessment

i) Clinical Examination:

Clinical examination of women showed that about 15% women had thin built, 12.6% women had hair abnormalities manifested either as lack of lustre or easy-pluckability. Hair abnormalities were highest in lactating women (16.0%), followed by pregnant (13.2%), non-pregnant non-lactating (12.5%) and pre-pregnant women (8.5%) respectively. 8.3% women had skin abnormalities which were seen as diffused-depigmentation of skin or presence of dry and scaly skin. Percentage of women with skin abnormalities were highest among pregnant group (11.0%). However this percentage was almost same (8.7%, 8.0%) for lactating and non-pregnant non-lactating women and least among pregnant women (5.5%). Overall 52.0% ladies had pale conjunctiva. The percentage of women with pale conjunctiva was highest among pregnant group (66.2%) followed by lactating women (54.2%). 49.0% non-pregnant non-lactating women and 38.5% pre-pregnant women also had pale conjunctiva, the signs indicative of anaemia. 94.9% women had normal lips whereas 4.3% women had angular-stomatitis and 0.8% cheilosis. Clinical examination of tongue showed 88.1% women (overall) had normal tongue with 11.9% women having abnormalities like red and raw tongue signs or pale and flabby tongue signs indicative of B-complex deficiency. Percentage of women having B-complex deficiency were comparatively higher among lactating and pregnant women. 9.1% women presented deficiency symptoms of Vitamin C (Bleeding Gums). 22.8% women had either spoon shaped nails or had white spots on nails, a common sign suggestive of anaemia among women.

Clinical assessment of women at large revealed symptoms and signs suggestive of anaemia as a common finding with occasional B-Complex deficiency symptoms which gets more prominent during pregnancy and lactation and continues during non-pregnant non-lactating status.

ii) Anthropometry:

Present study revealed that there was significant variation in the mean body weight of women in different physiological status. Overall mean body weight of women was 53.89 ± 8.53 Kgs which corresponds well with an average reference women. It was lowest in pre-pregnant state (51.10 ± 6.42 Kgs). There was not much difference in the mean body weight of lactating (52.88 ± 9.16 Kg) and non-pregnant non-lactating women (53.89 ± 8.53 Kgs). The mean body weight of pregnant women was expectedly higher. The mean height of women in the present study was 155.70 ± 7.34 cms and an insignificant difference ($p = .331$) in heights of women belonging to different physiological status was observed. Thus pointing towards the fact that height is independent of physiological status after it has attained particular potential. Mean BMI of women as per present study was 22.534 ± 3.4219 Kg/m^2. 69.3% women were normal as per BMI classification and 30.7% women had either under or over-nutrition. Mean BMI of pregnant and non-pregnant non-lactating women was towards higher side in comparison to pre-pregnant and lactating women. The overall percentage of women with BMI below 18.5 Kg/m^2 was very low, viz., 10.9% and it ranged between 11.5% in non-pregnant non-lactating women to 13.5% in lactating women. Thus minor percent of our mothers begin their reproductive life with chronic energy deficiency

iii) Nutrient Intake:

Overall mean calorie intake of women was 1967.07 ± 366.85 Kcal with about two-third (77.5%) of women having varying percentages of calorie deficit in comparison to RDA. 45.9% were

having upto 20% deficit. The mean calorie intake (1801.24 $\pm$ 279.75 Kcal) was lowest among pregnant ladies and the percentage of women with calorie deficit was also highest (94.0%) among them; moreover about one-third (30%) pregnant women had calorie deficit between 20% - 40% in comparison to RDA. This was because there was lower intake of bulk foods by pregnant women due to nausea vomiting etc. which are common features in pregnancy and also a specific dislike towards rice (a major source of calories in Kashmiri diet). Mean calorie intake was better in lactating women (2366.99 $\pm$ 401.99 Kcal) and percentage of women showing calorie deficit between 20% - 40% was almost half the percentage than in pregnancy (30.0%) and this improved calorie intake was because good percentage of women were consuming special foods during lactation. Mean calorie intake of pre-pregnant and non-pregnant non-lactating women was almost same i.e. 1856.38 $\pm$ 185.36 Kcal and 1843.68 $\pm$ 22.64 Kcal respectively. However, the percentage of women in pre-pregnant status with 20% - 40% calorie deficit was 17.5% as compared to 10.5% in non-pregnant non-lactating status. This was attributed to restricting of calories or foods in general during pre-pregnancy stage to maintain body shapes and avoid overweight. Mean calorie intake in relation to age revealed that with advancing age there was increased mean intake of calories among pregnant, pre-pregnant and non-pregnant non-lactating women. However inter-group variations were insignificant. It was further observed that with advancing age there was a decrease in percentage of women with below normal calorie intake per day in general as well as in different physiological groups. Similarly, almost no difference was observed in mean calorie intake among women in different physiological groups and also the percentage of women with normal or below normal calorie intake belonging to joint / nuclear families. Type of family showed some effect during lactation and pregnancy. Mean calorie intake of women belonging to different socio-economic classes showed lot of variations and inconsistency. Yet mean-calorie intake of pregnant women did increase as the socio-economic status improved whereas reverse was true for non-pregnant

non-lactating women. There was no definite relationship between occupation and calorie intake.

Literacy status had an positive impact on calorie intake of mothers i.e. mean calorie intake and percentage of women with normal calorie intake was higher among literate group as compared to illiterate. This was related to overall knowledge and understanding of nutritional requirements and intakes.

Overall mean protein intake of women was 51.07 $\pm$ 12.79 gms; with 76.3% having varying degrees of protein deficit, of which 41.7% were having only upto 20% protein deficit compared to RDA. Mean protein intake of lactating women was higher (63.91 $\pm$ 11.40 gms) than mean protein intake of pregnant and non-pregnant non-lactating women (45.72 $\pm$ 11.78 gms and 45.15 $\pm$ 8.62 gms respectively). The percentage of women with protein deficit was highest amongst pregnant group with 34.5% having more than 40% deficit and 32.0% having between 20% - 40% deficit. This was related to multiple factors such as dislike towards meat, food taboos like non-consumption of fish and curds, milk and fish together or egg and milk together. Mean protein intake among pre-pregnant women (49.49 $\pm$ 8.98 gms) was better than non-pregnant non-lactating women and the percentage of pre-pregnant women with protein deficit ranging between 20% - 40% was also better (13.5%) in comparison to non-pregnant non-lactating group (25.5%). The percentage of women with protein deficit (around 20% - 40%) being lesser in lactation than in pregnant women (32.0%) was because of consumption of protein rich foods used as special foods by women during lactation. It was also seen that with increase in age there was increase in mean protein intake in all physiological status. Percentage of women with below normal protein intake dropped down significantly with increase in age during pregnancy and lactation. Type of family as such had no definite impact on protein intake. Except non-pregnant non-lactating group, the mean protein intake and percent of women with normal protein intake was highest among professional women followed by

skilled group and housewives. Similarly mean protein intake and percentage of women with normal protein intake in relation to socio-economic status depicted that women from high socio-economic class had highest mean protein intake in all categories and those belonging to low socio-economic class had lowest mean protein intake. Mean protein intake and percent women with normal protein intake was higher among literate ladies as compared to illiterate women in general and also in different physiological status. The difference being statistically significant ($p = .000$). This was related to better knowledge and positive attitudes towards various protein rich foods.

Mean dietary Iron intake of women in general (11.0845 ± 5.8626 mgs) and in different physiological conditions was lower than RDA. Mean dietary iron intake was lowest in pregnant women (8.5124 ± 2.2517 mgs) and in pre-pregnant state it was 10.625 ± 2.1562 mgs (which was comparatively better than in pregnant and non-pregnant non-lactating status). During pregnancy percent women with 40% or more dietary Iron Intake deficit was more as compared to lactating group. This was not only related to poor intake of Iron rich foods (like green-leafy vegetables) throughout the year due to non-availability and variations in dietary consumption resultant of pregnancy induced nausea and vomiting but also to poor nutritional knowledge regarding sources and functions of nutrients in these groups. Age did not influence men dietary Iron intake of women in general and in different physiological status. Type of family and occupation as such had no definite effect one dietary Iron intake. However, mean dietary intake of literate women was better than illiterate women and professional women had higher mean dietary Iron intake per day (but lower to RDA), yet this trend was not seen in all physiological status which indicated that occupation did not as such influence dietary Iron intake.

Overall mean dietary Calcium intake of women was 434.72 ± 265.56 mgs (ranging between 75 mgs – 1684 mgs). The mean calcium intake was lowest among non-pregnant non-lactating women

(371.38 ± 180.95 mgs) and highest amongst women of lactating status (543.60 ± 337.91 mgs). There was not much difference in mean calcium intake of women belonging to pre-pregnant (421.18 ± 269.53 mgs) and pregnant (402.71 ± 214.33 mgs) status. Overall 78.2% women had dietary calcium deficit of varying degrees. 47.6% of the total studied women had > 40% calcium deficit, however the percentages were higher among women belonging to pregnant group (72.7%), followed by lactating women (67.0%). The lower calcium intake of women was related to exclusion of milk and milk products (71.3%), a major source of calcium in their diet and poor nutritional knowledge of women regarding sources of nutrients. While comparing the nutrient intake of studied group of women with RDA for different physiological status it was found that women consumed all nutrients in lesser quantities in general especially Iron was worst hit nutrient followed by calcium, calories and proteins respectively.

C. Dietary Habits

98.4% women were non-vegetarian and just 1.6% were vegetarian. Rice was universally consumed by all women irrespective of their physiological status. Food frequency showed 98.3% women consumed green-leafy vegetables on daily basis whereas 1.7% included it 4 – 5 times per week in their diet. 81.3% women consumed pulses on weekly basis and percentage consumption was comparatively better during pregnancy and non-pregnant non-lactating state. 92.5% of women consumed pulses occasionally and percentage consumption of pulses once or twice was almost negligible, however, it was better during pregnancy (11.7%) and lactation (7.5%). 46.2% of studied women included meat / poultry occasionally in their diet. Frequency of meat / poultry was better among pregnant (28.5%) women followed by pre-pregnant group (23.1%). This frequency was almost same among lactating and non-pregnant non-lactating women. More than half (56.4%) women in general consumed milk / curd occasionally, however it was mostly consumed by lactating (37.4%) and pregnant women (31.0%) on daily basis. Again there was not

much difference in the percentage of women belonging to pre-pregnant and non-pregnant non-lactating status as far as milk / curd consumption on daily basis was concerned. 62.4% women followed four-meal pattern, 33.6% ate five times a day and 4% followed three-meal pattern. Percentage of women following four-meal pattern was highest among pregnant group (80.3%) and five-meal pattern was mostly followed by lactating women (40%) and those belonging to non-pregnant non-lactating state (44.8%). Salt tea and (Tandoori roti) bread was common breakfast item and only one fifth mothers add milk during pregnancy and about 20% add egg in pregnancy and lactation.

There was vast variation in likes and dislikes of women in different physiological groups. Amongst cereals, wheat was liked by negligible percentage (0.9%) and rice was more liked during lactation and pre-pregnancy compared to pregnant and non-pregnant non-lactating status. 26.7% women liked pulses, however pulses were mostly liked by pre-pregnant and pregnant ladies. Similarly among milk and milk products curds was liked by half of the women (50%) that too during pregnant and lactating status. Amongst foods of animal origin poultry was most liked, followed by meat and liking for both these foods was low during pregnancy. Liking for same was better during non-pregnant non-lactating and pre-pregnant status. One-third of women liked green-leafy vegetables, however during pregnancy spinach and sag was more liked. Variation in liking for green-leafy vegetables was not much between women in different physiological status. One-fourth of women liked fruits especially apples and citrus fruits than dry fruits and liking for fruits was much better during pregnancy and lactation than pre-pregnant and non-pregnant non-lactating status.

Commonly disliked foods were some of cereals, green-leafy vegetables, animal foods, sweets and miscellaneous foods. 11.3% women belonging to pregnant group disliked rice, 12% meat whereas 48.0% didn't like knol khol and 57.2% didn't liked sweets during pregnancy. Low frequency of food intake for certain food items coupled with likes and dislikes especially for rice and animal foods was probably one of the major reasons for caloric as well as protein deficit during pregnancy and increased frequency / liking of these

items during lactational status had contributed to lowering of percentage deficit for mean calorie and protein intake. Even this was also responsible for specific nutrient insufficiency in these physiological states. The enormous variation in food likes and dislikes among women in general especially during various physiological status were attributed to cultural factors, social influences or relative availability of food items that has determined the overall consumption pattern.

Consumption pattern of vegetables varied with seasons. During summers women consumed seasonal and all seasonal vegetables mainly. Whereas during winters legumes and pulses, dried vegetables, roots and tubers and quince apples were consumed. This difference in the consumption pattern of vegetables is attributed to seasonal availability, and Kashmir Valley being a hilly area mostly remains covered by snow during winters and most often remains cut-off from its winter capital Jammu, so people have to depend on semi-perishable, perishable and preserved foods e.g. legumes and pulses, roots and tubers and dried vegetables.

Special foods were consumed overall by 69.3% women (pregnant / lactating), however they were preferably consumed during lactation as compared to pregnancy. Garden cress (30.4%), organ meat (18.2%), milk and milk products (15.1%) fish (10.1%), fruits juices (5.9) included the list of special foods consumed by lactating group. The beliefs for such consumption were increase in haemoglobin content by use of organ meat / garden cress, increase in milk production with satiety to the child through mothers milk by consuming fish; also adds calories and small fraction of proteins. The list of special foods consumed by pregnant women included fruit juices (29.1%), milk and milk products (17.3) and dry fruits (13.8). Pregnant women even consumed gum Arabica soaked in water or milk (12.8%) and sharbats (9.2%). Thus adding foods of no calorie value but minor protein and vitamin benefits. Percentage of women consuming special foods was highest among the age group 21-30 years. Type of family, socio-economic status showed better intake of special foods among women in joint family and high socio-economic class, occupation had no impact on same. During pregnancy literacy had an impact on special food consumption however during lactation it did not show any impact.

The most common food taboos generally followed by women were avoiding combination of fish and curds (67.9%), fish and milk (64.4%), dal and curds (27.4%) or discarding cooking water of spinach (22.0%). Likely nutritional impact of such restrictions or avoidance can lead to low calcium, vitamin and to some extent protein intake which other-wise is required in higher quantity during these physiological conditions and thus further adding to overall percentage deficit of these nutrients.

The dietary pattern of the women covered by the present study revealed that it was largely dependent on their habitual types and food items locally available. The food habits of Kashmiri women were also found to be related to seasonal variations that control the availability of food materials. Culture and taboos also had its impact on food habits of women.

D. NUTRITIONAL KNOWLEDGE

45.9% studied women in general had poor overall nutritional knowledge. Percentage of women with poor nutritional knowledge was more during pregnancy (21.5%) and lactation (17.0%).

53.8% women had poor knowledge regarding sources and functions of nutrients and nutrient losses during cooking and this percentage was much higher during pregnancy and lactation. However nutritional knowledge with regard to nutritional requirements was comparatively better among women in general (32.7%) with 29.1% having poor knowledge. The percentage of pregnant and lactating women with poor knowledge regarding nutritional requirements remained lowest – which lead us to believe that mothers do possess better idea about nutritional requirements, however they were ignorant as to how or where from these nutrients can be provided (sources) and what is their role (functions).

CONCLUSION AND RECOMMENDATIONS

Conclusion

The present study conducted among women around their reproductive period on nutritional status, dietary intake, food habits and nutritional knowledge revealed that majority of Kashmiri Women marry at proper age (21+ years) and observe family planning norms (2 or 3 children). They continue to live in joint families. Both literacy status and working status is on the rise.

The overall pre-pregnant nutritional status is better and is comparable to most of North Indian women however, anaemia constitutes a major (specific) nutritional problem throughout reproductive period with occasional B-complex deficiency being observed in small percentage of women. The main reason being low dietary Iron intake. The women in pre-pregnant stage have also predilection for restriction of diet (primarily calorie rich foods than protein rich) to maintain weight and body shape. During and after reproductive period although nutritional status remains more or less stable, yet calorie deficit can be observed in different physiological status. There is definite increase in percentage deficit of both calories and proteins especially in pregnancy than during lactation. The problem of anaemia is not only carried over to pregnancy as well as to lactational period but becomes more pronounced during pregnancy. This is mainly due to low intake of dietary iron because of poor knowledge about food sources, that is compounded by cultural beliefs, cooking practices, vague food habits, likes and dislikes. B-complex deficiency signs are also seen during these states. This is due to reduced intake of cereals, seasonal variation in intake of green-leafy vegetables and other foods rich in B-complex. The continuation of calorie insufficiency (deficit) to non-pregnant non-lactating state confirms influence of these factors having deep seated cultural roots. A significant influence of socio-cultural / socio-medical factors on food intake during pre-pregnancy, pregnancy and lactation showed both quantitative and qualitative improvement with better educational status, improved economic status and good occupational status

(working status). It is interesting to observe that these factors also affect the nutritional knowledge (with regard to source, requirement) and thus the intake.

RECOMMENDATIONS

In order to improve the knowledge and thereby have a favourable attitude and practices for better food intake by women of reproductive age, both long term and short term measures are recommended.

Amongst long-term measures various programs of general and specific nature are already in vogue. ***General* (welfare) *programs*** such as *Total literacy campaign 'TLC', income generating and poverty alleviation programs, improvement of women status programs, improvement of nutrition education by inducting nutrition syllabus in primary classes and adult literacy programs in their* long run will have a definite impact on overall nutritional status. ***Similarly specific programs*** like ICDS and specific nutrition programs [National Nutrition Anaemia Prophylaxis Program for prevention of nutrition anaemia] with direct nutritional components, have not only helped in enhancing nutritional status but also in improving nutritional knowledge amongst masses and thereby creating a favorable attitude towards better nutrition. What is required is to strengthen and support these activities and it is here that the department of Home Science can play a vital role by sensitizing implementing agencies. The department can hold seminars and symposia at regular intervals to stress importance and contribution of such programs in improving nutritional knowledge in communities. Also department could directly provide material support like providing nutrition education material or even conduct nutrition demonstration classes for the implementing agencies or for the communities. A highly co-ordinated effort can make it quite effective.

Short term measure proposed could be a unique co-ordinated effort of 'linking' "nutrition extension services" from the department

of Home Science through a specially identified cadre of 'Link workers'. These link workers (nutrition workers) would be identified from a large fleet of existing workers belonging to Health Department (Health workers – female or TBAS), Social Welfare Department (ICDS – AWW'S), Education Department (primary school teachers) who are local and are directly or indirectly involved in nutrition activities. The selected workers will be further motivated, reinforced and updated on nutritional knowledge (especially sources, requirements, cooking practices, socio-cultural factors etc.) on regular basis to enable them to interact and create awareness on various issues of food and nutrition. The entire activity can be co-ordinated and monitored by the department in collaboration with other departments and periodic evaluation can help in making desired changes where-ever required. Such type of a program activity has a tremendous potential if planned and co-ordinated properly.

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Appendix

Annexure – I

Scoring technique adapted for assessing nutritional knowledge regarding sources and functions of nutrients: (E1)

Scoring E_1: Do you think that the foods we consume have any function?

1. Yes
2. No.

Respondents with 1 as their response scored (1) Point and moved to E_2 where as women with negative response scored (0).

Scoring E_2: In your opinion how does food help to nourish the body?

1. Provides material for body building and tissue repair.
2. Protects body from disease and regulates the vial processes.
3. It supplies energy or fuel.
4. Gives strength to work.
5. We will die if we will not eat food.
6. It helps in removing hunger.
7. It improves vision.

Those whose response was 1, 2 and 3 scored (3), those whose response was 1, 2 or 2, 3 or 3,1 scored (2), those whose response was 1 or 2 or 3 or any other scored (1)

Scoring E_3: Do you know that food is composite of certain chemical substances called nutrients?

1. Yes
2. No.

Those with a positive response moved to E_4 and scored (1) point where as respondents with 2 as their response scored (0).

Scoring E_4: Nutrients with whom you are familiar?

1. Proteins
2. Carbohydrates
3. Fats
4. Minerals
5. Vitamins
6. Roughage

Those respondents who named more than three responses scored (3), those who named any three scored (2) and those who were familiar with less than three nutrients scored (1) point.

Scoring E_5: Which nutrient in your opinion is essential for body building?

1. Proteins
2. Fats
3. Carbohydrates
4. Vitamins
5. Minerals

Those whose response was 1 or 1 and 4 scored (3) points and those whose response was other than 1 scored (1) point only.

Scoring E_6: Which nutrient in your opinion is mainly concerned with energy production?

1. Carbohydrates
2. Vitamins

3. Minerals

4. Proteins

5. Fats

Those respondents whose response was 1 and 5 scored (2) points, those women whose replay was 1 or 5 scored (2) and lastly women whose answer was other than 1 and 5 scored (1) point only.

Scoring E_7: Which nutrients do you think are responsible for giving protection against diseases?

1. Vitamins
2. Minerals
3. Proteins
4. Carbohydrates
5. Fats

Respondents with their responses as 1 or 1 and 2 scored (3) points, those whose response was other than 3 scored (1) point only.

Scoring E_8: Which food group do you think supplies energy or calories?

1. Cereals, pulses
2. Nuts
3. Roots and tubers
4. Fats and oils
5. Sugar
6. Green-leafy vegetables
7. Milk and milk products
8. Meat, fish and poultry (flesh foods)
9. Fruits

Those respondents who responded positively to 5 out of first 6 scored (3) points, those who named any four out of first 6 (including

5th and 6th positively) scored (2) points and those with any other response scored (1) point.

Scoring E_9: Which foods are concerned with supply of proteins?

1. Cereals and Pulses
2. Nuts
3. Roots and Tubers
4. Fats and Oils
5. Sugar
6. Green-leafy Vegetables
7. Milk and Milk Products
8. Meat, Fish and Poultry
9. Fruits

Respondents with responses as 1, 8 and 9 scored (3) points 8 and 9, 8 or 9 only scored (2) points and those whose response was other than above mentioned (1 , 8 and 9) scored (1) point only.

Scoring E_{10}: Which foods supply vitamins and minerals?

1. Cereals and Pulses
2. Nuts
3. Roots and Tubers
4. Fats and Oils
5. Sugar
6. Green-leafy Vegetables
7. Milk and Milk Products
8. Flesh Food (Meat/ Fish/ Poultry)
9. Fruits

Those ladies whose response was 3, 7, 9 scored (3) points, those whose response was 3 or 7 or 10 or any combinations these scored (2) points and those with other than these responses scored (1) point.

Scoring E_{11}: What is a balanced diet in your opinion?

1. Rice and Sag
2. Meat / Fish / Poultry / Milk/ Egg
3. Foods that provide all nutrients required for growth and health.
4. Fruits
5. Foods from all groups in proper proportion
6. Green-leafy Vegetables

Respondents with their response as 5 scored (3) points, those whose replay was 3 scored (2) points and those with other than these tow options (3, 5) scored (1) point.

Annexure - II

Scoring system adopted for assessing knowledge regarding nutritional requirements: (E2)

Scoring F_1: Do you know there are recommended dietary allowances for each nutrient?

1. Yes
2. No

Score for Yes was (1) and for No (0). Those respondents whose response was Yes moved to F_2 and scored (1) point and those with no as their response scored (0).

Scoring F_2: Do you think energy requirement of sedentary, moderate and heavy worker differs?

1. Yes
2. No

Score for Yes was (1) and for No (0). Ladies with a positive response gained (1) point and moved to F_3 whereas those with negative response scored (0).

Scoring F_3: Who requires the maximum energy?

1. Sedentary Worker

2. Moderate Worker

3. Heavy Worker

Women whose answer was 3 scored (3) points, those with their response as 2 or 3 or 4 gained (1) point only.

Scoring F_{4A}: Are there certain periods in life when extra nutrients are required?

1. Yes

2. No

Those with a positive response scored (1) and moved to F_{4B} where as those women whose response was No scored (0).

Scoring F_{4B}: Specify the periods in life when extra nutrients are required?

1. Adolescence
2. Pregnancy
3. Lactation
4. During Stress and Strain, Illness
5. During Menstruation
6. Immediately after delivery

Respondents with their responses as 2, 3, 6 plus any other scored (3) points, those with their responses as 2 or 3 or 6 scored (2) points and those with their responses other than 2, 3 or 6 scored (1) point only.

Scoring F_{5A}: Do you think women require more iron than men?

1. Yes

2. No

Respondents with 1 as their responses scored (1) and moved to F_{5B} where those with No as their response scored (0).

Scoring F_{5B}: Specify the reason for more iron requirements of women.

1. Due to losses of blood during menstruation.

2. They bear the brunt of pregnancy and lactation.

3. They are week

4. They have to work hard.

Women with their response as 1 and 2 or 1 or 2 scored (3) points, those with other than this response scored (1) point only.

ANNEXURE - III

Scoring system adapted for assessing knowledge regarding cooking practices and nutrient loss: (E3)

Scoring G_{1A}: Do you think vegetables and fruits should be peeled after washing?

1. Yes

2. No

Women with Yes as their response scored (1) point and moved to G_{1B} where as those with 2 as their response scored (0) points.

Scoring G_{1B}: Specify the reason for the above (peeling after washing).

1. Nutritive value of fruits and vegetables decreases if they are washed after peeling.

2. Nutritive value increases

3. Cooking times is reduced

4. Digestibility of fruits and vegetables increases.

5. To remove dirt and grim

6. To reduce infections

Respondents with 1 or 1 and 5 as response scored (3) points and those with any other response scored (0).

Scoring G_2: Which method of cooking results in minimum loss of nutrients?

1. Frying
2. Boiling
3. Baking
4. Roasting
5. Pressure Cooking

Those respondents whose replay was 3 or 4 or 5 or all the three scored (3), those whose response was 2 scored (2) , whereas those whose response was other than 2, 3, 4 or 5 scored (1).

Scoring G_{3A}: Do you think that excess cooking water should be discarded?

1. Yes
2. No

Those with 1 as their response scored (1) point moved to $G_{3B,}$ while others scored (0).

Scoring G_{3B}: Specify the reason for not throwing excess cooking water.

1. Water soluble nutrients will be lost.
2. Protein content of food will decrease.
3. Foods will not be absorbed properly in the body
4. Fats are lost through water
5. Palatability of food decreases

Ladies with their response as 1 or 1 and 5 scored (3) those with other than these responses scored (1).

Scoring G_{4A}: Do you think consumption of raw vegetables as salads is more nutritious than cooked vegetables?

1. Yes
2. No

Those with 1 as their response scored (1) and moved to G_{4B} and

those with 2 gained (0) points.

Scoring G_{4B}: Specify the reason for considering salads more nutritious than cooked vegetables.

1. Raw vegetables are richest sources of minerals and vitamins
2. Cooking destroys vitamins
3. Raw vegetables are not digestible than cooked ones
4. Raw vegetables are good sources of vitamins
5. Raw vegetables contain more vitamins B_1 than cooked ones.

Ladies with the response as 1 and 1,3 scored (3) points, those with 1 as their response scored (2) where as others scored (1) point.

Scoring G_5: How many times should be rice washed before cooking?

1. Thrice
2. Twice
3. Once

Women with their responses as 3 scored (3) points where as those with 2 as their response scored (2) points and lastly those with 1 as their response scored (1) point.

QUESTIONNAIRE

Section - A

General Information:

1. ***Name*** ______________
2. ***Residence*** ______________
3. ***Age*** ______________
4. ***Religio*** ______________
5. ***Educational Status:***
   Illiterate / Primary / Secondary / Graduate / P.G.
6. ***Occupation***:
   a) Working b) Non – Working
   i) Govt. Employee
   ii) Farming
   iii) Any other
7. **Total Monthly Income**:
8. **Socio – Economic Status:**
   Upper class/Upper-Middle/Lower-Middle Class/Lower Class
9. **Type of family:**
   Joint / Nuclear.
10. **Family size:**
11. **Number of Children:**
12. **Physiological Status:**
    Pre – pregnant / Pregnant / Lactating / Non – pregnant Non-lactating

SECTION – B

Anthropometeric Measurements:

1. Height (in cms)

2. Weight (in Kgs)

3. Wt/Ht^2 (in m)

SECTION – C

CLINICAL EXAMINATION:

1. General Appearance:

Normal built / Thick built / Thin built / Over Weight.

2. Hair:

Normal / Dull / Easy pluck-ability

3. Eyes:

Bitots Spots /Pale Conjunctiva / Poor Vision in dim light / Normal.

4. Lips:

Normal / Angular Stomatitis / Cheilosis.

5. Tongue:

Normal / Red and Raw / Pale and Flabby

6. Teeth:

Normal / Dental Caries /Poor Chewing.

7. ***Gums:***

Normal / Bleeding gums.

8. ***Skin:***

Normal / Dry and Scaly/ Diffused depigmentation.

9. ***Nails:***

Normal / Spoon Shaped / White Spots over nails.

(source: "Social and Preventive Medicine" by K. Park 1997)

<u>SECTION – D</u>

DIETARY HABITS:

1. ***Nature of diet:***

Vegetarian / Non vegetarian.

2. ***If Vegetarian do you consume the following foods?***
   i) Eggs
   ii) Cheese
   iii) Curds
3. ***Which foods do you like most?***
4. ***Which foods you dislike most?***
5. ***a) Do you follow any food taboos?***
   i) Yes
   ii) No

b) ***If yes, specify if any of these,***

i) Fish and curds

ii) Fish and milk

iii) Curds and dal

iv) Eggs and milk

v) Any other, specify

6. ***Vegetables commonly consumed in summer.***

7. ***Vegetable commonly consumed in winter.***

8. ***What is your meal pattern?***

9. ***Food you often consume for various meals:-***

i) Breakfast.

ii) Lunch.

iii) Afternoon.

iv) Dinner.

v) Any other.

10. ***Do you use vegetables as salads?***

i) Yes

ii) No

11. *Do you include fruits in your daily diet?*

i) Yes

ii) No

12. *Medium of cooking vegetables?*

i) Mustard oil.

ii) Vegetable oil.

iii) Any other, specify.

13. *Dietary Recall (24 hours recall)*

DAY / DATE /

S. No.	Type of Food	Food Stuffs	Quantity in (House hold measures)	Quantity in gms
i.	Breakfast			
ii.	Lunch			
iii.	Tea Time			
iv.	Dinner			
v.	Any other			

14. *What is frequency of consumption of following food stuffs?*

S.No.	FOOD STUFFS	FREQUENCY					
		D	W_1	W_2	W_{4-5}	M_1	O
i	Rice						
ii	Wheat flour						
iii	Bengal gram dal.						
iv	Green gram dal.						
v	Rajmah						
vi	Hak (Brussel Sprouts)						
vii	Spinach.						
viii	Knol-Khol greens						
ix	Carrot						
x	Onions						
xi	Potatoes						
xii	Radish						
xiii	Turnip						
xiv	Brinjal						
xv	Cucumber						
xvi	Capsicum						
xvii	Tomatoes						
xviii	Chilies						
xix	Ginger						
xx	Garlic						
xxi	Apple						
xxii	Fish						
xxiii	Egg						
xxiv	Chicken						
xxv	Milk						
xxv	Curds						
xxvi	Butter						
xxvii	Tea (Salt)						
xxviii	Tea (Sugar)						
xxix	If any other specify						

D	=	*Daily*
W_1	=	*Weekly Once*
W_2	=	*Twice in a Week*
W_{4-5}	=	*4-5 Times a Week*
M_1	=	*Monthly Once*
O	=	*Occasionally*

15. *Specific question for pregnant / lactating women.*

a) Do you consume any special foods during pregnancy / lactation?

i) Yes

ii) No

b) If yes, specify.

SECTION – E

NUTRITIONAL KNOWLEDGE :

1. Have you any knowledge about "Foods and Nutrition"?

i) Yes

ii) No.

2. If yes, specify the sources of information.

i) School ii) College

iii) Through Radio / T.V. / Magazines / Books and Bulletins / Relatives and Friends / Other sources

E1. *KNOWLEDGE REGARDING SOURCES AND FUNCTIONS OF NUTRIENTS:*

1. *Do you think that the foods we consume have any function?*

   i) Yes

   ii) No

2. *In your opinion how does food help to nourish the body? (Tick as many options as you feel are right).*

   i) It provides material for body building and tissue repair.

   ii) It protects the body from disease and regulates the vital processes

   iii) It supplies energy or fuel.

   iv) Any other specify.

3. *Do you know that the food is composite of certain chemical substances called nutrients?*

   i) Yes

   ii) No.

4. *If yes, tick the ones with whom you are familiar.*

   i) Proteins.

   ii) Carbohydrates.

iii) Fats.

iv) Minerals.

v) Vitamins.

vi) Roughage.

5. *Which nutrient in your opinion is essential for body building?*

i) Proteins.

ii) Fats.

iii) Carbohydrates.

iv) Vitamins.

v) Minerals.

6. *Which nutrient in your opinion is mainly concerned with energy production?*

i) Carbohydrates.

ii) Vitamins.

iii) Minerals.

iv) Proteins.

v) Fats.

7. *Which nutrient do you think is responsible for giving protection against diseases?*

i) Carbohydrates.

ii) Proteins.

iii) Fats.

iv) Vitamins.

v) Minerals.

8. *Which foods do you think supply energy or calories?*

i) Cereals, pulses,

ii) Nuts,

iii) Roots and Tubers,

iv) Fats and oils,

v) Sugar.

vi) Green-leafy vegetables.

vi) Milk and milk products.

viii) Meat, fish and poultry (flesh foods).

ix) Fruits.

9. *Which foods are concerned with supply of proteins?*

i) Cereals, pulses,

ii) Nuts,

iii) Roots and Tubers,

iv) Fats and oils,

v) Sugar.

vi) Green-leafy vegetables.

vii) Milk and milk products.

viii) Meat, fish and poultry (flesh foods).

ix) Fruits.

10. *Which foods supply vitamins and minerals?*

i) Cereals, pulses,

ii) Nuts,

iii) Roots and Tubers,

iv) Fats and oils,

v) Sugar.

vi) Green-leafy vegetables.

viii) Milk and milk products.

viii) Meat, fish and poultry (flesh foods).

ix) Fruits.

11. *What is a balanced diet in your opinion?*

E2. Knowledge Regarding Nutritional Requirements:

1. *Do you know that there are recommended dietary allowances for each nutrient?*

i) Yes.

ii) No.

2. Do you think that energy requirement of sedentary, moderate and heavy worker differs?

i) Yes

ii) No

3. Who requires the maximum energy?

i) Sedentary worker.

ii) Moderate worker.

iii) Heavy workers.

4. Do you think that there are certain periods in life when extra nutrients are required?

i) Yes

ii) No

5. If yes, what are they specify

6. Do you think that women require more iron than men?

i) Yes.

ii) No.

7. If yes why?

E3. KNOWLEDGE REGARDING COOKING PRACTICES AND NUTRIENT LOSS:

1. *a) Do you think that vegetables and fruits should be peeled after washing?*

i) Yes.

ii) No.

b) If yes, specify the reason:

i) The nutritive value of fruits and vegetables decreases if they are peeled after washing.

ii) Nutritive value increases.

iii) Cooking time is reduced.

iv) Digestibility of food and vegetables increases

v) Any other specify.

2. *Which method of cooking results in minimum loss of nutrients?*

i) Frying.

ii) Boiling.

iii) Baking.

iv) Roasting.

v) Pressure cooking.

3. ***Do you think that excess cooking water should be discarded?***

i) Yes

ii) No

4. ***If no, specify the reason:***

i) Water soluble nutrients will be lost through water.

ii) Protein content of food will decrease.

iii) Foods will not be absorbed properly in the body.

iv) Fats are lost through water.

v) Any other specify.

5. ***Do you think that consumption of raw vegetables as salads are more nutritious than cooked vegetables?***

i) Yes

ii) No

6. ***If yes, specify the reason:***

i) Raw vegetables are good sources of proteins.

ii) Cooking destroys vitamins.

iii) Raw vegetables are more digestible than cooked ones.

iv) Raw vegetables are good sources of Vitamin D.

v) Raw vegetables contain more Vitamin B1 than cooked ones.

7. *How many times should be rice washed before cooking?*

i) Thrice.

ii) Twice.

iii) Once.

Ms. Nighat Nasreen: is presently working as lecturer and Co-Ordinator food technology add-on-course at Government Degree College for Women M.A.Road Srinagar Kashmir. She has a doctorate in home science (Food and Nutrition) from the University of Kashmir and is member of postgraduate and undergraduate Board of studies university of Kashmir. She has more than 15 years of teaching experience and has taught postgraduate as well as undergraduate students of valley in home science Discipline, food and nutrition stream. During her carrier she has actively participated in and presented papers in seminars concerning nutrition. She has worked on women and nutrition, weaning practices of infants and nutritional status of school going children.

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